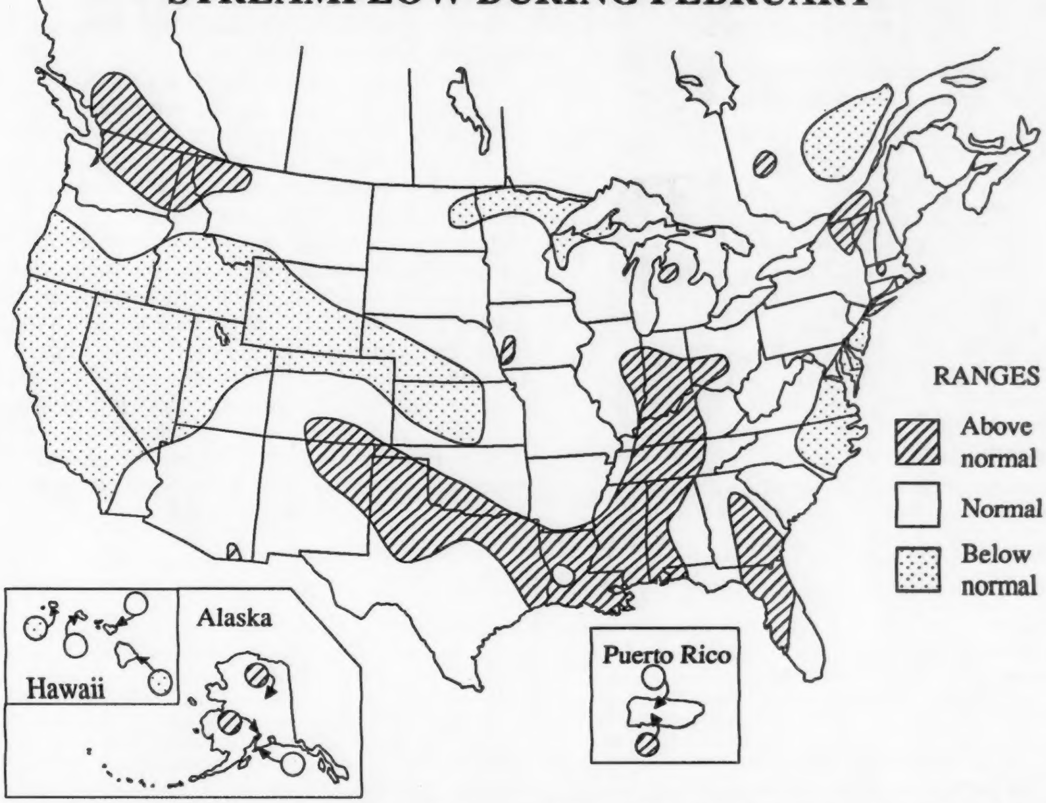
National Water Conditions

UNITED STATES
Department of the Interior
Geological Survey

CANADA
Department of the Environment
Water Resources Branch

FEBRUARY 1991

STREAMFLOW DURING FEBRUARY



There was continuing drought in California despite heavy precipitation which began near the end of February. New lows occurred at 4 of the 6 streamflow index stations in the State, contents of 9 of 10 index reservoirs were in the below-average range, and there was no usable storage in Lake Tahoe for the sixth consecutive month. Water level in the alluvial aquifer well at Baldwin Park fell to an all-time monthly low. In Florida, new February lows occurred in two wells in the Upper Floridan aquifer, as ground-water levels continued to be affected by the long-term drought in that State.

By contrast, heavy rains fell in the Southeast February 16-20, particularly in Mississippi and Alabama. A peak of record occurred on the Tombigbee River at Bevill Lock and Dam, near Pickensville, Alabama.

Streamflow was in the normal to above-normal range at 79 percent of the index stations in the United States, southern Canada, and Puerto Rico during February. Below-normal range streamflow occurred in 20 percent of the area of the conterminous United States and southern Canada during February. Total flow for the 174 index stations in the conterminous United States and southern Canada was 18 percent above median and 1 percent less than last month.

The combined flow of the 3 largest rivers in the lower 48 States--Mississippi, St. Lawrence, and Columbia--averaged 30 percent above median and in the above-normal range, despite a 27 percent decrease in flow from January to February. Flow of the St. Lawrence River was in the above-normal range after 11 consecutive months in the normal range.

Monthend index reservoir contents for February 1991 were in the below-average range at 35 of 100 reporting sites, compared with 33 at the end January (and also 33 the end of February 1990).

Mean February elevations at four master gages on the Great Lakes (provisional National Ocean Service data) were in the normal range on both Lake Superior and Lake Huron, and in the above-normal range on both Lake Erie and Lake Ontario.

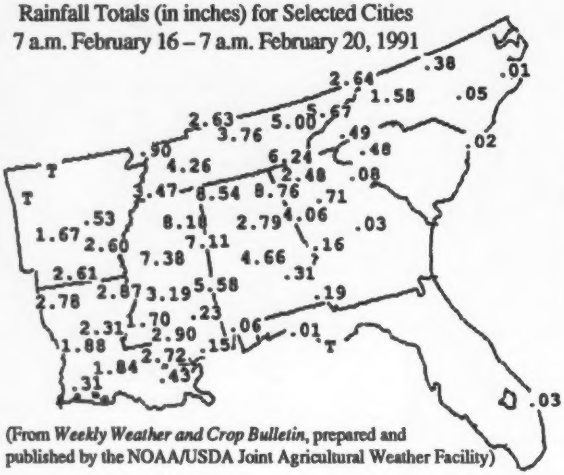
Utah's Great Salt Lake rose 0.10 foot to 4,202.50 feet above National Geodetic Vertical Datum (NGVD) of 1929 during February. Lake level is 2.10 feet lower than at the end of February 1990, and 9.35 feet lower than the maximum of record.

SURFACE-WATER CONDITIONS DURING FEBRUARY 1991

There was continuing drought in California (see pages 6-9) despite heavy precipitation which began near the end of February.

By contrast, heavy rains fell in the Southeast February 16-20 (map below), particularly in Mississippi and Alabama. Recurrence intervals for peak discharges in Mississippi were generally about 10 years and there were no record peaks. A peak of record occurred on the Tombigbee River at Bevill Lock and Dam, near Pickensville, Alabama. (The period of record at this site is only 10 years.) The peak discharge of 180,000 cubic feet per second (cfs), at a stage of 44.30 feet, on February 22, 1991, exceeded the previous high (December 26, 1990) by 35,000 cfs and 0.25 foot.

Rainfall Totals (in inches) for Selected Cities
7 a.m. February 16 – 7 a.m. February 20, 1991



(From *Weekly Weather and Crop Bulletin*, prepared and published by the NOAA/USDA Joint Agricultural Weather Facility)

Streamflow was in the normal to above-normal range at 79 percent of the index stations in the United States, southern Canada, and Puerto Rico during February, the same as during January, compared with 76 percent of stations in those ranges during February 1990. Below-normal range streamflow occurred in 20 percent of the area of the conterminous United States and southern Canada during February 1991, compared with 22 percent during January 1991 and 23 percent during February 1990. Total February 1991 flow of 863,300 cfs for the 174 index stations in the conterminous United States and southern Canada was 18 percent above median, 1 percent less than last month, and 24 percent less than flow during February 1990.

Seven new extremes (table on page 4), five lows and two highs, occurred at streamflow index stations, compared with three lows and four highs during January. The lows occurred at one station in Kansas and four stations in California, while the highs occurred at stations in Georgia and Florida. Hydrographs for those stations where new extremes occurred are on page 5.

The combined flow of the 3 largest rivers in the lower 48 States—Mississippi, St. Lawrence, and Columbia—averaged 1,341,000 cfs; 30 percent above median and in the above-normal range, despite a 27 percent decrease in flow from January to February. Flow of the St. Lawrence River was in the above-normal range after 11 consecutive months in the normal range. Flow of the Mississippi River was in the normal range after an above-normal range and record high January. Flow of the Columbia River was in the normal range for the second consecutive month. Hydrographs for both the combined and individual flows of the "Big 3" are on page 10.

(Continued on page 4)

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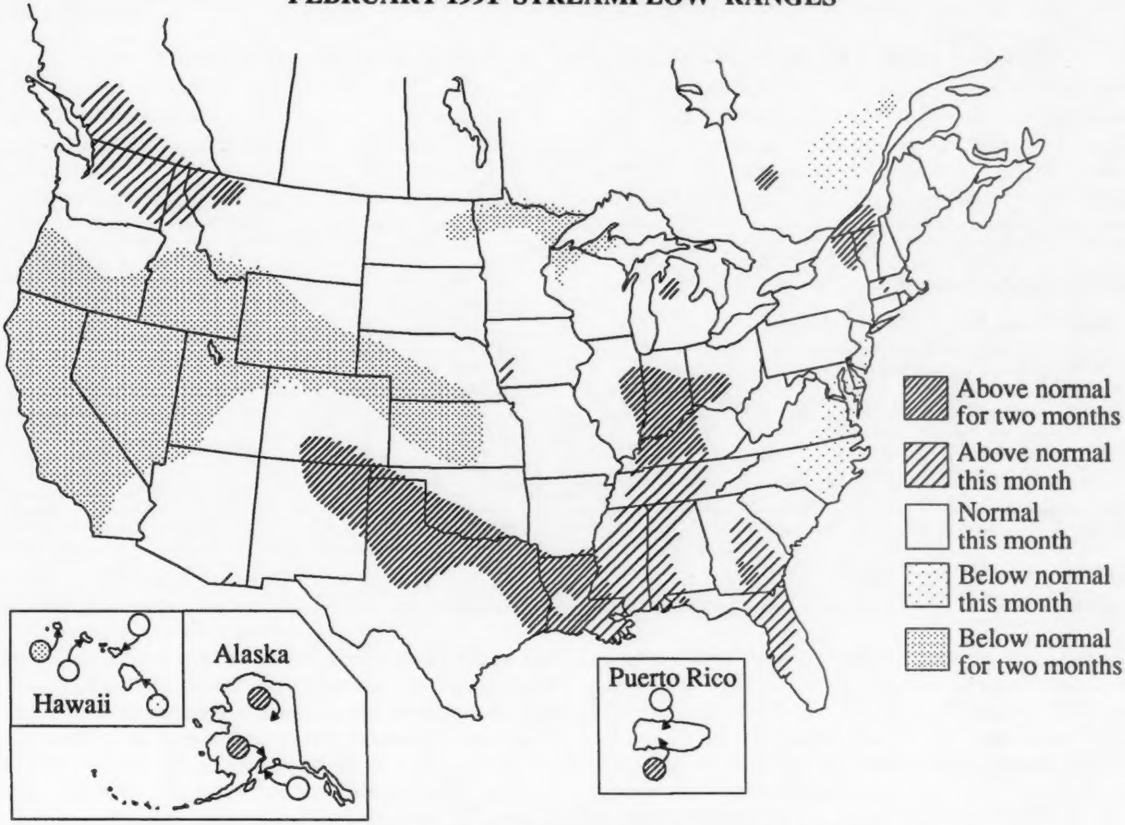
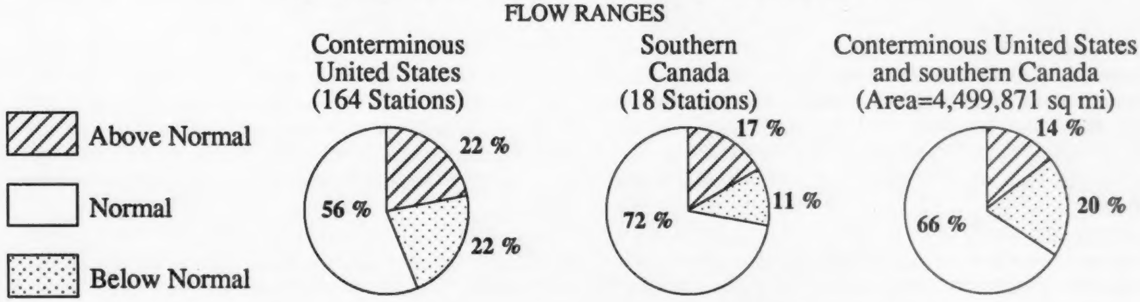
FEBRUARY 1991 STREAMFLOW RANGES

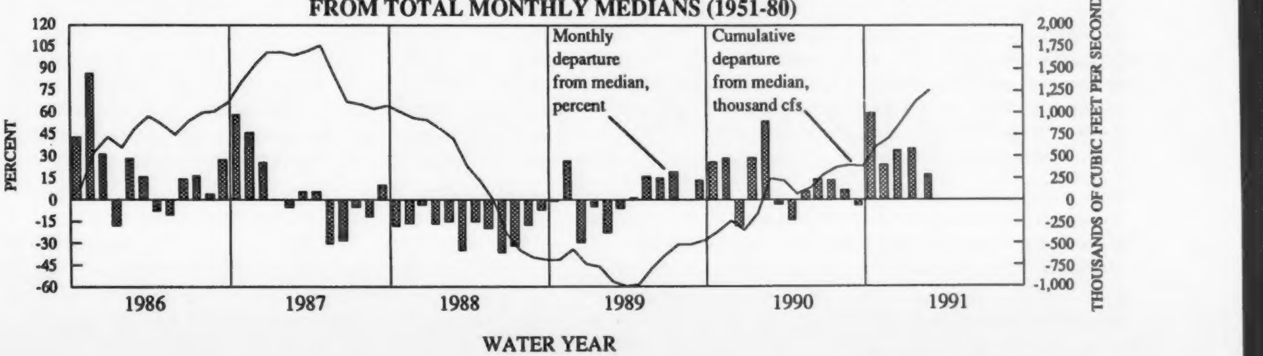


SUMMARY OF FEBRUARY 1991 STREAMFLOW

FLOW RANGES



MONTHLY AND CUMULATIVE DEPARTURE OF TOTAL MONTHLY MEANS FROM TOTAL MONTHLY MEDIANS (1951-80)



Provisional data; subject to revision

NEW EXTREMES DURING FEBRUARY 1991 AT STREAMFLOW INDEX STATIONS

Station number	Stream and place of determination	Drainage area (square miles)	Years of record	Previous February extremes (period of record): Monthly mean in cfs (year)	Previous February extremes (period of record): Daily mean in cfs (year)	February 1991: Monthly mean in cfs	February 1991: Percent of median	February 1991: Daily mean in cfs	February 1991: Day
	LOW FLOWS								
06867000	Saline River near Russell, Kansas	1,502	39	7.52 (1978)	2.00 (1979)	5.50	17	2.60	7
10296000	West Walker River below Little Walker River, near Coleville, California	181	52	26.5 (1977)	15.0 (1977)	25.3	43	22.0	26
11098000	Arroyo Seco near Pasadena, California	16	79	.93 (1924)	.70 (1930)	.52	5	.45	*
11264500	Merced River at Happy Isles Bridge, near Yosemite, California	181	75	13.6 (1977)	7.50 (1977)	8.09	8	5.20	1
11427000	North Fork American River at North Fork Dam, California	342	49	80.7 (1977)	41.0 (1977)	69.2	5	39.0	1
	HIGH FLOWS								
02317500	Alapaha River at Statenville, Georgia	1,400	59	7,315 (1986)	18,600 (1986)	7,968	422	20,700	1
02320500	Suwannee River at Branford, Florida	7,880	59	23,200 (1987)	38,500 (1986)	28,260	350	33,600	12

*Occurred more than once.

Dissolved solids and water temperatures at five large river stations are also given on page 10. Flow data for the "Big 3" and 42 other large rivers are given in the Flow of Large Rivers table on page 11.

Monthend index reservoir contents for February 1991 were in the below-average range (below the monthend average for the period of record by more than 5 percent of normal maximum contents) at 35 of 100 reporting sites, compared with 33 at the end January (and also 33 the end of February 1990), including most reservoirs in Nova Scotia, North Carolina, Nebraska, the Dakotas, Montana, Idaho, Wyoming, Colorado, Utah, Nevada, and California. Contents were in the above-average range at 48 reservoirs (compared with 50 last month), including most reservoirs in Quebec, Maine, New Hampshire, Vermont, Massachusetts,New York, New Jersey, Maryland, South Carolina, Georgia, the Tennessee Valley, Texas, Oklahoma, Wisconsin, Minnesota, and Washington. Reservoirs with contents in the below-average range and significantly lower than last year (with normal maximum contents of at least 1,000,000 acre-feet) are: Lake McConaughy, Nebraska; Boise River, Idaho; Upper Snake River, Idaho-Wyoming; Bear Lake, Idaho-Utah; Folsom, Clair Engle Lake, Lake Berryessa, and Shasta Lake, California; and also the Colorado River Storage Project. Reservoirs with less than 10 percent of normal maximum contents (February average in parentheses) are: Hetch Hetchy, 7 percent (30), Isabella, 7 percent (29), and Pine Flat, 4 percent (54), California; Lake Tahoe, California-Nevada, 0 percent (52); and Rye Patch, Nevada, 1 percent (55). Graphs of contents for seven reservoirs are shown on page 12 with contents for the 100 reporting reservoirs given on page 13.

Mean February elevations at four master gages on the Great Lakes (provisional National Ocean Service data) were in the normal range on both Lake Superior and Lake Huron, and in the above-normal range on both Lake Erie and Lake Ontario. The normal-range level on Lake Superior ended a 16-month string of levels in the below-normal range on that lake. Levels fell from those for January on Lake Superior, Lake Huron, and Lake Erie, but rose on Lake Ontario from that for last month. February levels ranged from 0.19 foot lower (Lake Superior) to 0.20 foot higher (Lake Ontario) than those for January. Monthly means have now been in the normal range for one month on Lake Superior and nine months on Lake Huron. Means on both Lake Erie and Lake Ontario were in the above-normal range for the second consecutive month. February 1991 levels ranged from 0.14 foot (Lake Superior) to 1.23 feet higher (Lake Ontario) than those for February 1990. Stage hydrographs for the master gages on Lake Superior, Lake Huron, Lake Erie, and Lake Ontario are on page 14.

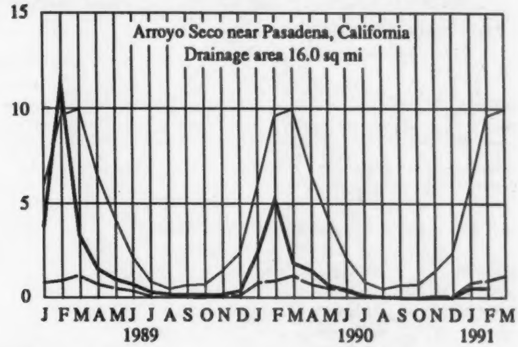
Utah's Great Salt Lake (graph on page 14) rose 0.10 foot to 4,202.50 feet above National Geodetic Vertical Datum (NGVD) of 1929 during February. The seasonal low of 4,202.20 feet above NGVD of 1929 occurred on November 22, 1990. Lake level is 2.10 feet lower than at the end of February 1990, and 9.35 feet lower than the maximum of record which occurred in June 1986 and March-April 1987.

Streamflow conditions for February 1991 and February 1990 are shown by maps on page 15. February 1991 has 22 percent less area in the above-normal range, 46 percent less area in the below-normal range, and about 47 percent more area in the normal range than February 1990. Above-normal range streamflow occurred during both months in parts of Alaska, Montana, Ontario, Quebec, Vermont, Massachusetts, Illinois, Indiana, Ohio, Kentucky, Tennessee, Alabama, Florida, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas. Below-normal range streamflow occurred during both months in parts of Oregon, Idaho, Montana, Wyoming, Nebraska, North Dakota, Minnesota, Wisconsin, Michigan, Quebec, California, Nevada, Utah, Colorado, and Kansas. The locations of reservoirs with below-average contents at the end of both months are also shown on the respective maps.

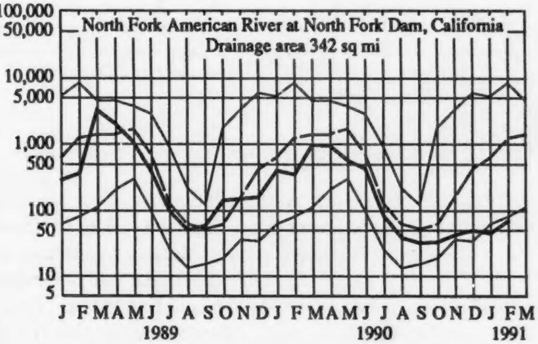
Graphs for 12 hydrologic areas show monthly percent departure of streamflow from median for the 1986-91 water years (page 16) and also compare monthly streamflow for the 1990 and 1991 water years with median monthly streamflow for 1951-80 (page 17).

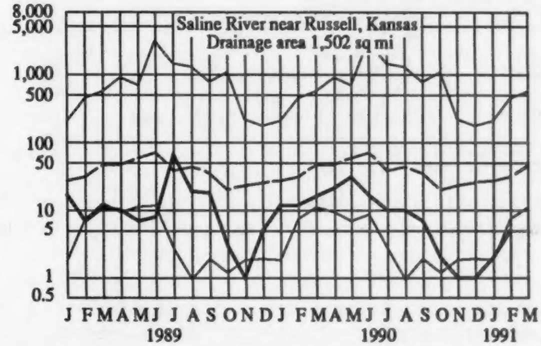
MONTHLY MEAN DISCHARGE OF SELECTED STREAMS

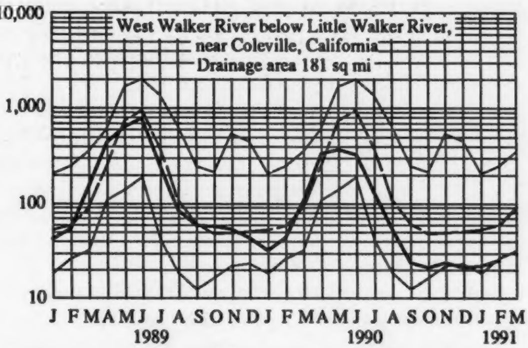
Area between light-weight solid lines indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period, 1951-80. Heavy line indicates mean for current period.

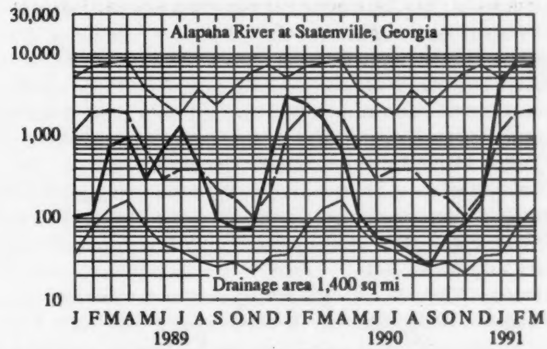


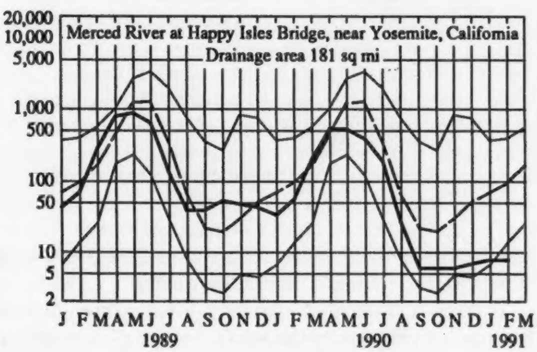
DISCHARGE IN CUBIC FEET PER SECOND

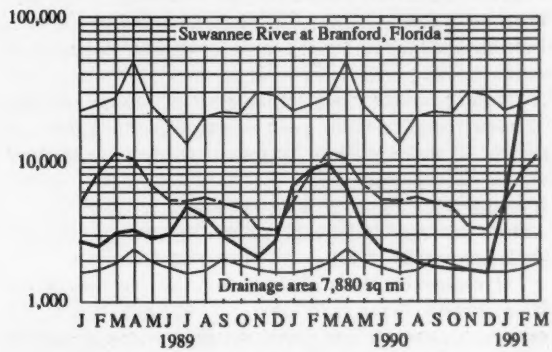












HYDROLOGIC CONDITIONS AND WATER-SUPPLY OUTLOOK IN CALIFORNIA

From *California Water Supply Outlook* (Department of Water Resources, Division of Flood Mangement, Flood operations and Hydrology Branches)

Rain began in southern California during the last two days of February, moved gradually north, then surged southward across Central California again on the 4th of March. Mountain amounts were impressive with many stations exceeding 20 percent of the yearly total. Estimated precipitation in the Northern Sierra Nevada increased from about 21 to 44 percent of the seasonal average to date. Amounts in the northern end of the State were not as heavy. This storm series was not enough to raise the water year out of the critical category, but does ease the harshness of the drought.

Snowpack gains were impressive. Based on automatic sensor reports, the statewide water content rose from 14 to 42 percent of average. The most important change was in the southern Sierra where the pack appears now to be about half average for this date.

Storm runoff on the coastal rivers north of San Francisco caused rises to over flood warning levels, on the Smith, Eel, Russian, and Napa Rivers. Moderate runoff in the Central Valley Rivers was mostly caught by reservoirs.

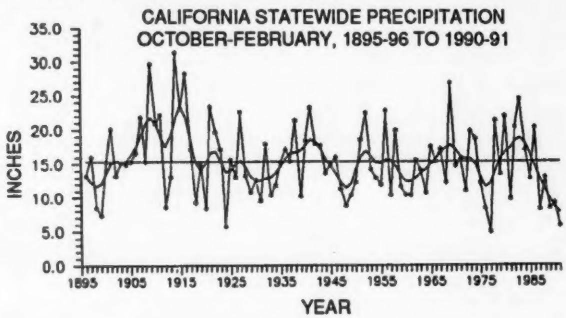
Total in-state reservoir storage at the end of February was about 12 million acre-feet (MAF), 48 percent of the historical average of 25 MAF, and 1 MAF less than the end of February 1977. (1977 was the driest year of record.)

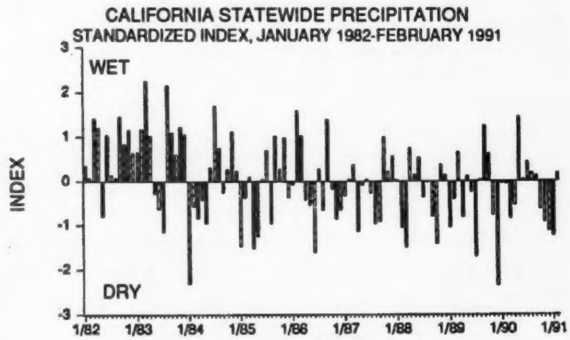
Spring snowmelt runoff forecasts, based on end of February data (as the storm series was just starting) indicated about 25 percent of average runoff.

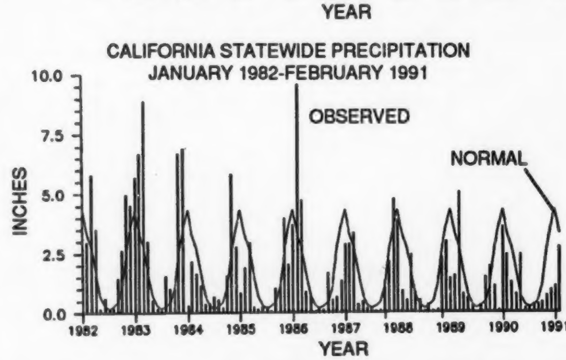
The median Sacramento River Index water year forecast rose from 5.5 MAF, 29 percent of average, to 7.3 MAF, 39 percent of average. This would make 1991 the 4th driest of record. The median forecasts assume normal future weather. Last year's Sacramento River Index was 9.2 MAF.

(From Climate Perspectives Branch, Global Climate Lab, NCDC, NOAA)

Conditions are especially dry in California. A major storm system at the end of the month brought much needed precipitation to the state, however long-term conditions still continued extremely dry. October-February 1990-91 ranked as the third driest October-February period on record (first graph below). Dry conditions have occurred during the last five years (first and second graphs below), due largely to deficient moisture during the usually wet winter months (third graph below).







(From *Weekly Weather and Crop Bulletin*, prepared and published by the NOAA/USDA Joint Agricultural Weather Facility)

A much welcomed, much needed stormy pattern rapidly evolved over the eastern Pacific Ocean in late February. Tantalizing showers, the first rain in 6 weeks, pushed ashore in southern California on the 27th. Heavy rain developed that

night from San Francisco southward. By 4 a.m. Pacific Standard Time (PST) on Thursday, up to 5 inches of rain had pelted the southern coastal mountains. A 1- to 2 inch rainfall was noted at all sea-level stations south of San Francisco Bay. Even Death Valley recorded an inch from this initial surge of moisture.

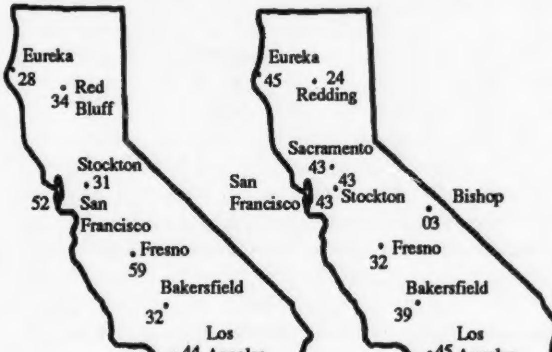
Substantial rain continued in southern California until March 1. Storm rainfall totals were generally 3 to 5 inches in coastal areas but approached 15 inches in the mountains northeast of San Diego. Rain and mountain snow reached northern California by the 28th, continuing until March 4. Liquid equivalent precipitation exceeded 4 inches along the west slopes of the southern Cascades and the Sierra Nevada range from Mount Shasta southward to Sequoia National Park.

But the drought is not over. Through the end of February, this water year (October 1, 1990 to September 30, 1991) is still the third driest on record, after 1977 and 1924. A comparison to 1977 shows similar percentages of normal precipitation through the end of February. Only about 30 percent of the annual total precipitation can be expected for the next 7 months. The Metropolitan Water District, which serves 15 million customers in southern California, has already reduced water supplies by 50 percent to agricultural users and by 20 percent to residential customers. In the State's fertile, but irrigation dependent, Central Valley, a 75- to 100-percent reduction in water deliveries is a precaution in case the drought lasts into a sixth year.

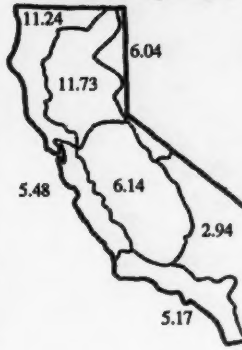
But the storm has been good news to the State's ailing snowpack, runoff, and reservoir levels. In just 5 days, statewide percentage of normal precipitation for the water year vaulted from 21 to 41 percent. In the Sierra Nevada Mountains, snowpack increased from 14 percent of normal to 42 percent of normal. Badger Pass, at 7,300 feet, went from bare ground to a 39-inch pack by March 4. The rain and future meltwater will also boost reservoir levels and stream runoff. At the end of February, the State's reservoir holdings stood at 48 percent of normal. The State's runoff, as measured by river gauging stations, was an anemic 15 percent of normal. Though more recent data is not yet available, reservoir levels and runoff improved during the first few days of March.

Percentage of Normal Precipitation for Period Indicated

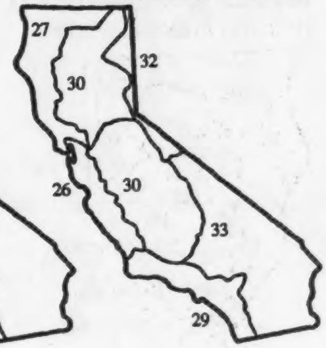
October 1976 – February 1977 October 1990 – February 1991



Average Precipitation by Climatic Division (inches) for March – September



Percentage of Annual Total Precipitation Falling During the Period March – September



California Storm Totals (inches)
4 a.m. February 27 – 4 a.m. March 4 (PST)

LOCATION OF INDEX STATIONS IN CALIFORNIA

The location of each *National Water Conditions* index station in California is shown on the map above.

Streamflow conditions at six California index stations from October 1983 through February 1991 show the monthly progression from a time of above-average precipitation and streamflow during the 1984 water year to the latest period of drought. Most of the precipitation which produces runoff and ground-water recharge in California occurs from November through February. Streamflow usually reaches seasonal lows during September-October in California. Over half of the combined median runoff at the six index stations occurs from December through March, the bulk of it during February. Snow at higher elevations, usually melting from March on, occasional rainfall, and ground-water discharge sustain streamflow for the rest of the year. The cumulative departure line is steepest when large monthly departures occur. The two best examples of this are February-March 1986—very wet months with severe floods during February and lesser floods during March, and each month having more than 80 percent above the median streamflow—and February-March 1988—very dry months, with each month having less than 35 percent of the median streamflow. The six streamflow index stations in California are listed below. February lows occurred at four of the six stations this month.

Smith River at Crescent City—Drains directly to the Pacific Ocean from northwestern California, with a drainage area of 609 square miles, and records since 1932.

Sacramento River at Verona—Drains the northern half of California's Central Valley, with a drainage area of 21,257 square miles, and records since 1930.

North Fork American River at North Fork Dam—An eastern tributary of the Sacramento River, with a drainage area of 342 square miles, and records since 1942.

West Walker River below Little Walker River, near Coleville—On the eastern side of the Sierra Nevada in north-central California, draining to the Great Basin, with a drainage area of 180 square miles, and records since 1939.

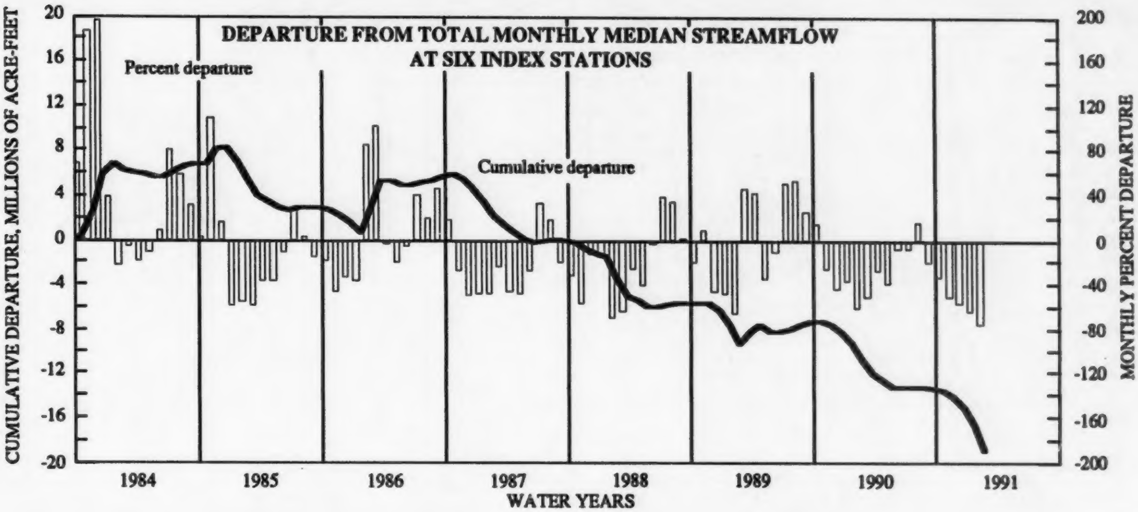
Merced River at Happy Isles Bridge, near Yosemite—An eastern tributary of the San Joaquin River, which drains the southern half of California's Central Valley, with a drainage area of 181 square miles, and records since 1916.

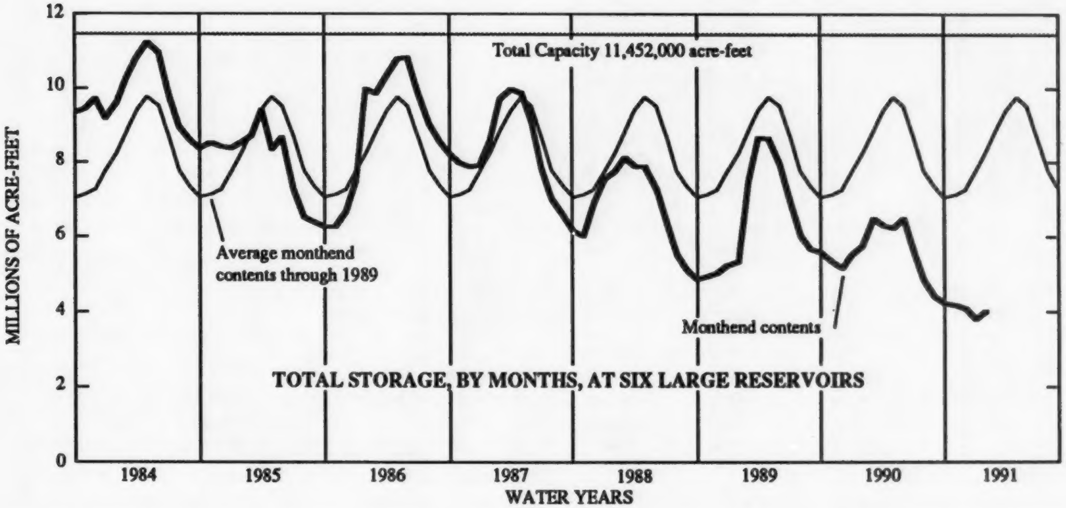
Arroyo Seco near Pasadena—A tributary of the Los Angeles River, with a drainage area of 16 square miles, and records since 1912.

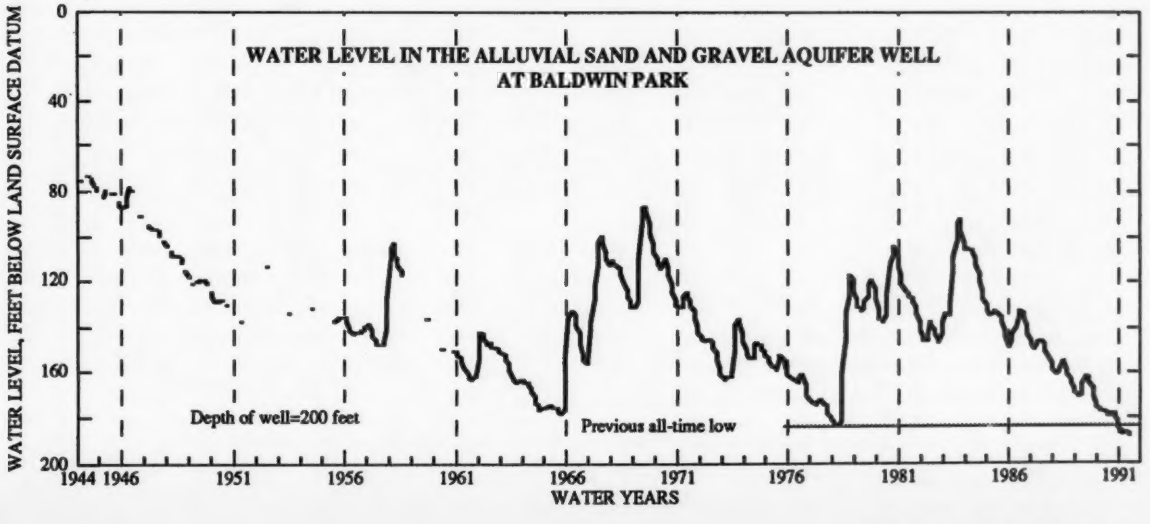
Total storage for six large reservoirs in California shows clearly the progression from the wet conditions of the 1984 water year through the current drought years, ending in January 1991. Reservoir contents declined during the 1985 water year, but increased greatly during the floods of February-March 1986, as previously indicated with regard to cumulative streamflow departures. The six large reservoirs are those with normal maximum contents of 1,000,000 acre-feet or more as shown in the reservoir table on page 13: Folsom Lake near Folsom, Pine Flat Lake near Piedra, Clair Engle Lake near Lewiston, Lake Almanor near Prattville, Lake Berryessa near Winters, and Shasta Lake near Redding. The only index reservoir of the six with contents at or above the long-term average for February is Lake Almanor.

Month-end water levels for a shallow (200-feet deep) observation well in a heavily-pumped alluvial sand and gravel aquifer at Baldwin Park (west of Los Angeles) show clearly the effects of both recent and previous droughts. The previous all-time low of 183.79 below land surface in December 1977 occurred at the end of the "1977 drought." Levels rose rapidly when recharge from the heavy precipitation which ended the drought reached the aquifer. Water level in the well dropped below the previous all-time low in August 1990 and has remained below that level through the end of February 1991. The water level at the end of February was 188.28 below land surface, about 4.5 feet below the previous low and only about 11.8 feet above the bottom of the well.

The general trend of water level in this well is probably typical of those for levels in many alluvial aquifers in southern California. At least one observation well in a nearby similar aquifer, but only about 165 feet deep, has gone dry. Many alluvial aquifers in southern California are used as sources of water by small municipalities, farmers, and also by individuals.

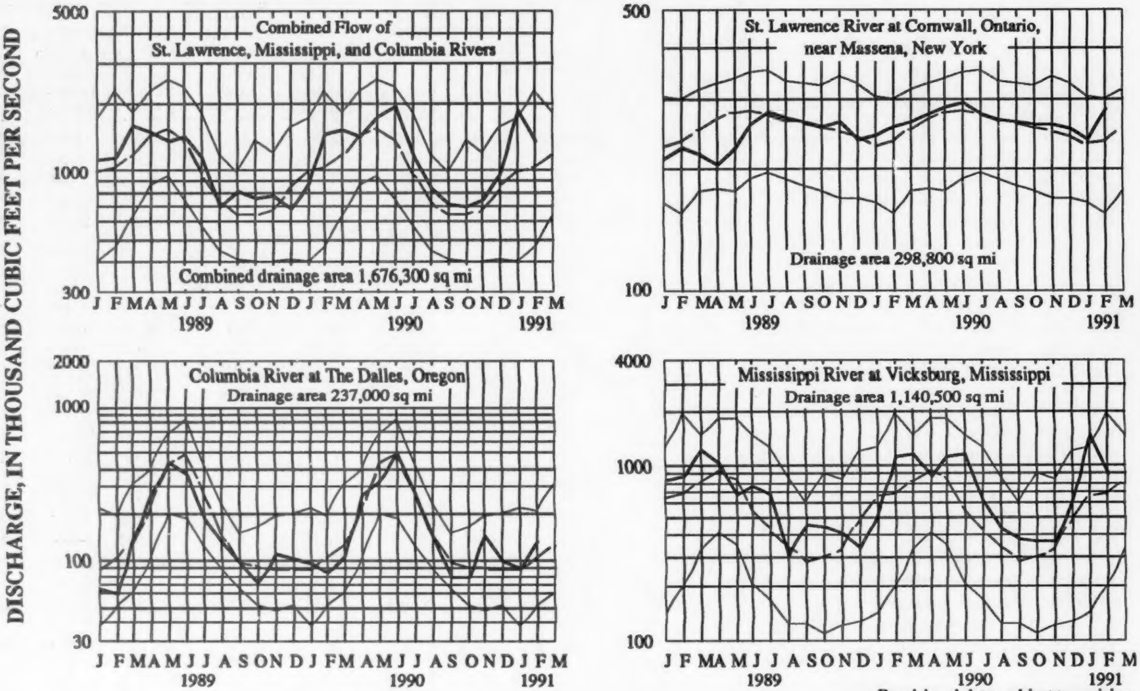

DEPARTURE FROM TOTAL MONTHLY MEDIAN STREAMFLOW
AT SIX INDEX STATIONS
Percent departure
Cumulative departure
CUMULATIVE DEPARTURE, MILLIONS OF ACRE-FEET
MONTHLY PERCENT DEPARTURE
20
16
12
8
4
0
-4
-8
-12
-16
-20
200
160
120
80
40
0
-40
-80
-120
-160
-200
1984
1985
1986
1987
1988
1989
1990
1991
WATER YEARS


Total Capacity 11,452,000 acre-feet
Average monthend
contents through 1989
Monthend contents
TOTAL STORAGE, BY MONTHS, AT SIX LARGE RESERVOIRS
MILLIONS OF ACRE-FEET
12
10
8
6
4
2
0
1984
1985
1986
1987
1988
1989
1990
1991
WATER YEARS


WATER LEVEL IN THE ALLUVIAL SAND AND GRAVEL AQUIFER WELL
AT BALDWIN PARK
Depth of well=200 feet
Previous all-time low
WATER LEVEL, FEET BELOW LAND SURFACE DATUM
0
40
80
120
160
200
1944
1946
1951
1956
1961
1966
1971
1976
1981
1986
1991
WATER YEARS

HYDROGRAPHS FOR THE "BIG THREE" RIVERS

Area between light-weight solid lines indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period, 1951-80. Heavy line indicates mean for current period.



Provisional data; subject to revision

DISSOLVED SOLIDS AND WATER TEMPERATURES, FOR FEBRUARY 1991, AT DOWNSTREAM SITES ON FIVE LARGE RIVERS

Station number	Station name	February data of following calendar years	Stream discharge during month: Mean (cfs)	Dissolved-solids concentration[1]: Minimum (mg/L)	Dissolved-solids concentration[1]: Maximum (mg/L)	Dissolved-solids discharge[1] (tons per day): Mean	Dissolved-solids discharge[1] (tons per day): Minimum	Dissolved-solids discharge[1] (tons per day): Maximum	Water temperature[2]: Mean in °C	Water temperature[2]: Minimum in °C	Water temperature[2]: Maximum in °C
01463500	Delaware River at Trenton,	1991	13,930	82	107	3,530	2,657	5,773	3.5	1.5	5.5
	New Jersey, (Morrisville,	1945-90	13,580	61	144	[3]3,431	647	15,600	[3]2.5	0.0	8.5
	Pennsylvania)	(Extreme yr)		(1954)	(1977)		(1976)	(1984)			
			[4]12,240								
07289000	Mississippi River at	1991	925,000	173	217	485,600	424,500	568,300	6.0	4.5	6.0
	Vicksburg, Mississippi	1976-90	1,039,000	153	288	380,400	108,000	628,200	5.5	0.0	10.5
		(Extreme yr)		(1989)	(1986)		(1977)	(1986)			
			[4]672,800								
03612500	Ohio River at lock and dam 53,	1991	653,000	166	221	......	202,000	548,000	...	6.5	7.0
	near Grand Chain, Illinois,	1955-90	451,200	98	308	......	44,900	419,000	...	0.0	10.0
	(streamflow station at Metropolis,	(Extreme yr)		(1957)	(1967)		(1955)	(1974)			
	Illinois)		[4]410,900								
06934500	Missouri River at Hermann,	1991	49,200	342	398	49,000	35,300	91,200	4.5	2.0	6.5
	Missouri. (60 miles west of	1976-90	68,430	205	537	70,130	23,500	237,000	3.5	0.0	12.0
	St. Louis, Missouri)	(Extreme yr)		(1985)	(1985)		(1977)	(1985)			
			[4]49,190								
14128910	Columbia River at Warrendale,	1991	194,000	91	100	50,300	40,600	59,200	3.0	2.0	5.0
	Oregon (streamflow station at	1976-90	165,900	87	128	50,820	24,500	106,500	4.0	0.5	7.0
	The Dalles, Oregon)	(Extreme yr)		(1976)	(1977, 1986)		(1989)	(1982)			
			[4]104,800								

[1]Dissolved-solids concentrations, when not analyzed directly, are calculated on basis of measurements of specific conductance.
[2]To convert °C to °F: [(1.8 x °C) + 32] = °F.
[3]Mean for 7-year period (1983-90).
[4]Median of monthly values for 30-year reference period, water years 1951-80, for comparison with data for current month.

Provisional data; subject to revision

FLOW OF LARGE RIVERS DURING FEBRUARY 1991

Station number	Stream and place of determination	Drainage area (square miles)	Average discharge through September 1985 (cubic feet per second)	February 1991: Monthly mean discharge (cubic feet per second)	Percent of median monthly discharge 1951-80	Change in discharge from previous month (percent)	Discharge near end of month: Cubic feet per second	Million gallons per day	Date
01014000	St. John River below Fish River at Fort Kent, Maine ...	5,665	9,758	3,052	155	–36	3,100	2,000	28
01318500	Hudson River at Hadley, New York	1,664	2,908	2,530	148	–41	2,180	1,410	28
01357500	Mohawk River at Cohoes, New York	3,456	5,683	7,020	141	8	4,300	2,780	28
01463500	Delaware River at Trenton, New Jersey	6,780	11,670	13,930	114	–13	11,600	7,500	28
01570500	Susquehanna River at Harrisburg, Pennsylvania	24,100	34,340	45,100	112	–28	57,000	36,800	24
01646500	Potomac River near Washington, District of Columbia...	11,560	[1]11,500	12,900	81	–64	......	......	...
02105500	Cape Fear River at William O. Huske Lock, near Tarheel, North Carolina.	4,852	5,002	3,544	39	–69	......	......	...
02131000	Pee Dee River at Peedee, South Carolina	8,830	9,871	13,340	88	–44	1,350	872	28
02226000	Altamaha River at Doctortown, Georgia	13,600	13,730	40,310	183	119	14,100	9,110	28
02320500	Suwannee River at Branford, Florida	7,880	6,986	28,260	350	450	21,100	13,600	28
02358000	Apalachicola River at Chattahoochee, Florida	17,200	22,420	31,440	99	94	24,000	15,500	28
02467000	Tombigbee River at Demopolis lock and dam, near Coatopa, Alabama.	15,385	23,520	70,350	156	107	215,000	139,000	28
02489500	Pearl River near Bogalusa, Louisiana	6,573	9,880	22,140	130	46	41,100	26,600	28
03049500	Allegheny River at Natrona, Pennsylvania	11,410	[1]19,580	33,700	131	–23	37,300	24,100	25
03085000	Monongahela River at Braddock, Pennsylvania	7,337	[1]12,480	24,430	133	–20	18,900	12,200	25
03193000	Kanawha River at Kanawha Falls, West Virginia	8,367	12,550	19,990	105	–28	20,600	13,300	27
03234500	Scioto River at Higby, Ohio	5,131	4,583	11,480	160	–23	4,710	3,040	28
03294500	Ohio River at Louisville, Kentucky[2]*	91,170	115,800	280,200	160	94	276,000	178,000	26
03377500	Wabash River at Mount Carmel, Illinois	28,635	27,660	58,620	158	–42	44,800	29,000	28
03469000	French Broad River below Douglas Dam, Tennessee[3]* ..	4,543	[1]6,739	10,760	105	45	......	......	...
04084500	Fox River at Rapide Croche Dam, near Wrightstown, Wisconsin.[2]	6,010	4,238	2,980	82	–14	2,280	1,470	28
04264331	St. Lawrence River at Cornwall, Ontario, near Massena, New York.[4]*	298,800	243,900	283,000	121	19	305,000	197,000	28
02NG001	St. Maurice River at Grand Mere, Quebec	16,300	24,910	3,150	51	–49	22,500	14,500	28
05082500	Red River of the North at Grand Forks, North Dakota...	30,100	2,593	304	27	63	350	226	28
05133500	Rainy River at Manitou Rapids, Minnesota	19,400	12,920	5,400	58	–28	4,800	3,100	25
05330000	Minnesota River near Jordan, Minnesota	16,200	3,680	440	87	12	525	339	28
05331000	Mississippi River at St. Paul, Minnesota*	36,800	[1]11,020	3,289	66	5	3,390	2,190	28
05365500	Chippewa River at Chippewa Falls, Wisconsin	5,650	5,149	1,823	55	–6	2,000	1,300	27
05407000	Wisconsin River at Muscoda, Wisconsin	10,400	8,710	7,557	109	12	6,000	3,900	28
05446500	Rock River near Joslin, Illinois	9,549	6,080	7,750	175	104	7,000	4,500	28
05474500	Mississippi River at Keokuk, Iowa*	119,000	63,790	46,160	111	47	48,900	31,600	28
06214500	Yellowstone River at Billings, Montana	11,795	7,056	2,540	94	10	2,090	1,350	28
06934500	Missouri River at Hermann, Missouri*	524,200	80,880	48,910	99	–3	45,300	29,300	28
07289000	Mississippi River at Vicksburg, Mississippi[5]*	1,140,500	584,000	925,000	137	–39	1,073,000	694,000	25
07331000	Washita River near Dickson, Oklahoma	7,202	1,402	747	181	–59	535	345	28
08276500	Rio Grande below Taos Junction Bridge, near Taos, New Mexico.	9,730	742	591	122	17	675	436	28
09315000	Green River at Green River, Utah	44,850	6,391	2,199	73	26	......	......	...
11425500	Sacramento River at Verona, California	21,251	19,430	8,030	21	–13	......	......	...
13269000	Snake River at Weiser, Idaho	69,200	18,520	10,800	55	–2	11,900	7,690	27
13317000	Salmon River at White Bird, Idaho	13,550	11,390	3,900	85	10	4,230	2,730	27
13342500	Clearwater River at Spalding, Idaho	9,570	15,510	15,600	158	111	14,900	9,630	28
14105700	Columbia River at The Dalles, Oregon[6]*	237,000	[1]193,500	133,000	127	50	209,000	135,000	28
14191000	Willamette River at Salem, Oregon	7,280	[1]23,690	30,640	66	–3	13,100	8,470	28
15515500	Tanana River at Nenana, Alaska	25,600	23,810	7,500	117	7	7,500	4,850	28
08MF005	Fraser River at Hope, British Columbia	83,800	96,250	54,020	159	72	48,700	31,500	28

[1]Adjusted.

*Indicates stations excluded from the combination bar/line graph. See Explanation of Data.

[2]Records furnished by Corps of Engineers.

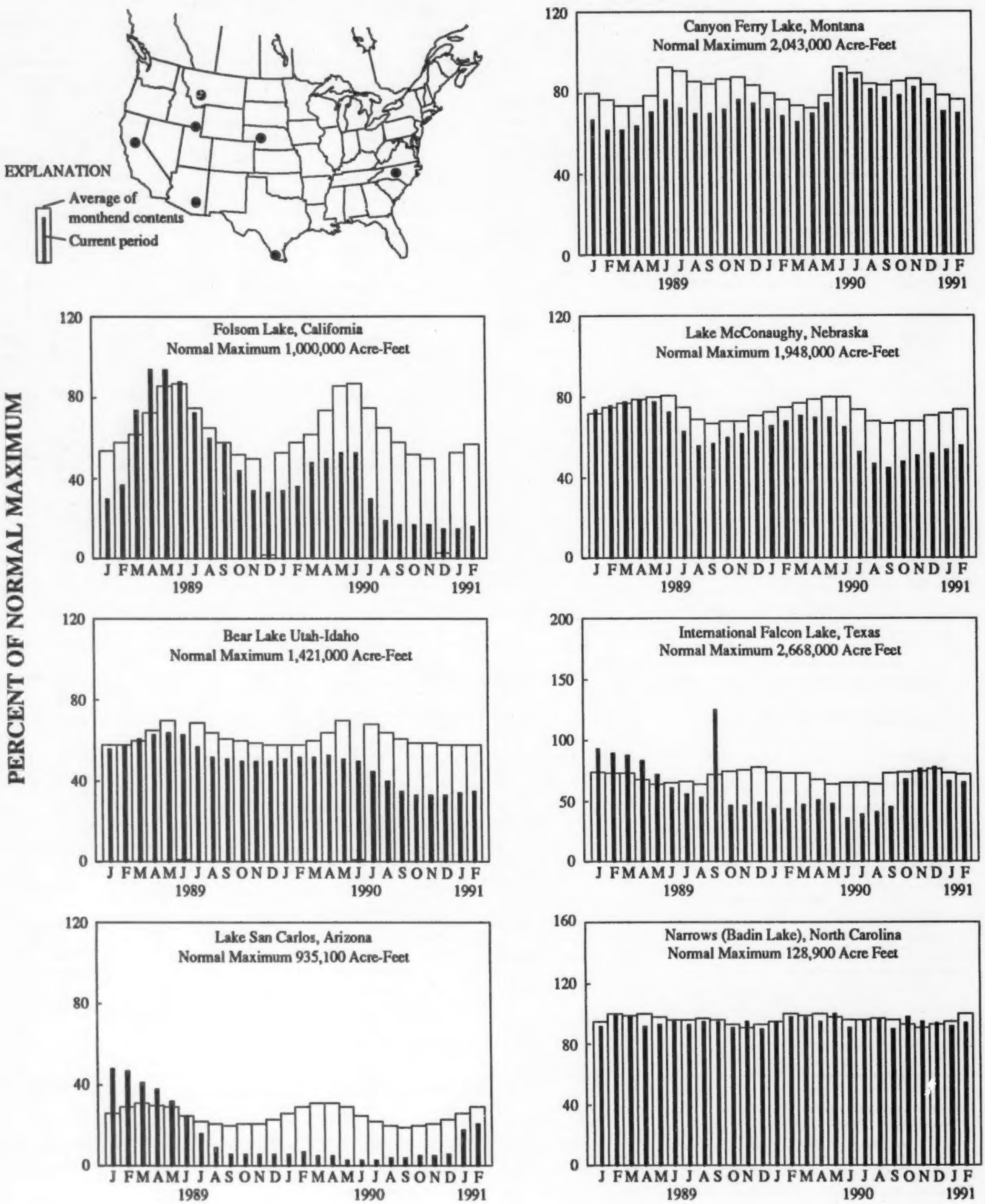
[3]Records furnished by Tennessee Valley Authority.

[4]Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y., when adjusted for storage in Lake St. Lawrence.

[5]Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.

[6]Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.

USABLE CONTENTS OF SELECTED RESERVOIRS AND RESERVOIR SYSTEMS



Provisional data; subject to revision

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF FEBRUARY 1991

[Contents are expressed in percent of reservoir (system) capacity. The usable storage capacity of each reservoir (system) is shown in the column headed "Normal maximum"]

Reservoir Principal uses: F-Flood control I-Irrigation M-Municipal P-Power R-Recreation W-Industrial	Percent of normal maximum: End of February 1991	Percent of normal maximum: End of February 1990	Percent of normal maximum: Average for end of February	Percent of normal maximum: End of January 1991	Normal maximum (acre-feet)[1]
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	49	56	59	56	[2]226,300
QUEBEC					
Allard (P)	40	52	30	26	280,600
Gouin (P)	65	44	52	78	6,954,000
MAINE					
Seven Reservoir Systems (MP)	54	42	40	71	4,107,000
NEW HAMPSHIRE					
First Connecticut Lake (P)	26	30	20	47	76,450
Lake Francis (FPR)	52	47	31	74	99,310
Lake Winnipesaukee (PR)	54	61	51	67	165,700
VERMONT					
Harriman (P)	42	61	33	56	116,200
Somerset (P)	63	41	51	71	57,390
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	86	93	70	89	77,920
NEW YORK					
Great Sacandaga Lake (FPR)	54	48	36	71	786,700
Indian Lake (FMP)	56	74	42	66	103,300
New York City Reservoir System (MW)	95	96	83	93	1,680,000
NEW JERSEY					
Wanaque (M)	93	98	80	94	85,100
PENNSYLVANIA					
Allegheny (FPR)	31	36	26	32	1,180,000
Pymatuning (FMR)	88	96	86	94	188,000
Raystown Lake (FR)	67	67	57	67	761,900
Lake Wallenpaupack (PR)	54	68	51	58	157,800
MARYLAND					
Baltimore Municipal System (M)	98	93	88	98	261,900
NORTH CAROLINA					
Bridgewater (Lake James) (P)	86	98	84	93	288,800
Narrows (Badin Lake) (P)	94	98	100	92	128,900
High Rock Lake (P)	63	96	74	76	234,800
SOUTH CAROLINA					
Lake Murray (P)	85	91	72	82	1,614,000
Lakes Marion and Moultrie (P)	80	89	76	69	1,777,000
SOUTH CAROLINA-GEORGIA					
Strom Thurmond Lake (FP)	75	79	66	69	1,730,000
GEORGIA					
Burton (PR)	81	81	68	81	104,000
Sinclair (MPR)	94	89	87	100	214,000
Lake Sidney Lanier (FMPR)	51	65	56	47	1,686,000
ALABAMA					
Lake Martin (P)	79	95	76	75	1,375,000
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	59	49	40	43	2,293,000
Douglas Lake (FPR)	29	34	22	15	1,395,000
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	57	66	50	50	1,012,000
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	60	54	42	48	2,880,000
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	61	69	48	80	1,478,000
WISCONSIN					
Chippewa and Flambeau (PR)	67	66	29	77	365,000
Wisconsin River (21 Reservoirs) (PR)	42	29	19	57	399,000
MINNESOTA					
Mississippi River Headwater System (FMR)	30	29	18	29	1,640,000
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	54	57	77	56	22,700,000
SOUTH DAKOTA					
Angostura (I)	45	45	72	43	130,770
Belle Fourche (I)	28	37	53	27	185,200
Lake Francis Case (FIP)	75	71	76	66	4,589,000
Lake Oahe (FIP)	59	63	68	56	22,240,000
Lake Sharpe (FIP)	100	101	99	100	1,697,000
Lewis and Clark Lake (FIP)	84	83	89	99	432,000
NEBRASKA					
Lake McConaughy (IP)	56	68	74	54	1,948,000
OKLAHOMA					
Eufaula (FPR)	94	103	88	97	2,378,000
Keystone (FPR)	82	96	92	84	661,000
Tenkiller Ferry (FPR)	102	108	92	104	628,200
Lake Altus (FIMR)	67	90	53	65	133,000
Lake O'The Cherokees (FPR)	88	99	82	96	1,492,000
OKLAHOMA-TEXAS					
Lake Texoma (FMPRW)	95	92	88	96	2,722,000
TEXAS					
Bridgeport (IMW)	87	90	49	87	386,400
Canyon (FMR)	97	84	81	94	385,600
International Amistad (FIMPW)	95	72	84	94	3,497,000
International Falcon (FIMPW)	65	44	72	66	2,668,000
Livingston (IMW)	104	102	90	99	1,788,000
Possum Kingdom (IMPRW)	92	87	93	93	570,200
Red Bluff (P)	24	32	32	23	307,000
Toledo Bend (P)	103	101	87	102	4,472,000
Twin Buttes (FIM)	54	48	35	52	177,800
Lake Kemp (IMW)	94	96	85	95	268,000
Lake Meredith (FMW)	31	39	36	32	796,900
Lake Travis (FIMPRW)	100	64	82	96	1,144,000
MONTANA					
Canyon Ferry (FIMPR)	70	69	77	71	2,043,000
Fort Peck (FPR)	55	57	80	55	18,910,000
Hungry Horse (FIPR)	60	71	63	70	3,451,000
WASHINGTON					
Ross (PR)	46	39	40	63	1,052,000
Franklin D. Roosevelt Lake (IP)	89	90	68	89	5,022,000
Lake Chelan (PR)	68	44	35	74	676,100
Lake Cushman (PR)	83	22	81	68	359,500
Lake Merwin (P)	99	100	96	100	245,600
IDAHO					
Boise River (4 Reservoirs) (FIP)	42	48	61	39	1,235,000
Coeur d'Alene Lake (P)	104	50	52	57	238,500
Pend Oreille Lake (FP)	43	39	51	37	1,561,000
IDAHO-WYOMING					
Upper Snake River (8 Reservoirs) (MP)	57	73	69	50	4,401,000
WYOMING					
Boysen (FIP)	73	70	67	73	802,000
Buffalo Bill (IP)	42	53	61	40	421,300
Keyhole (F)	16	23	42	15	193,800
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	35	38	51	33	3,056,000
COLORADO					
John Martin (FIR)	16	17	23	12	364,400
Taylor Park (IR)	68	65	56	71	106,200
Colorado-Big Thompson Project (I)	48	36	57	48	730,300
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Fontenelle, Navajo, and Blue Mesa Reservoirs (IFPR)	64	72	70	65	31,620,000
UTAH-IDAHO					
Bear Lake (IPR)	35	52	58	34	1,421,000
CALIFORNIA					
Folsom (FIP)	16	36	57	15	1,000,000
Hetch Hetchy (MP)	7	26	30	10	360,400
Isabella (FIR)	7	14	29	8	568,100
Pine Flat (FI)	4	9	54	4	1,001,000
Clair Engle Lake (Lewiston) (P)	39	54	77	30	2,438,000
Lake Almanor (P)	68	72	54	66	1,036,000
Lake Berryessa (FIMW)	36	51	85	36	1,600,000
Millerton Lake (FI)	35	40	64	37	503,200
Shasta Lake (FIPR)	35	54	74	36	4,377,000
CALIFORNIA-NEVADA					
Lake Tahoe (IPR)	0	0	52	0	744,600
NEVADA					
Rye Patch (I)	1	8	55	1	194,300
ARIZONA-NEVADA					
Lake Mead and Lake Mohave (FIMP)	78	83	70	77	27,970,000
ARIZONA					
San Carlos (IP)	21	7	29	18	935,100
Salt and Verde River System (IMPR)	49	50	49	48	2,019,100
NEW MEXICO					
Conchas (FIR)	61	67	83	60	315,700
Elephant Butte and Caballo (FIPR)	63	75	44	65	2,394,000

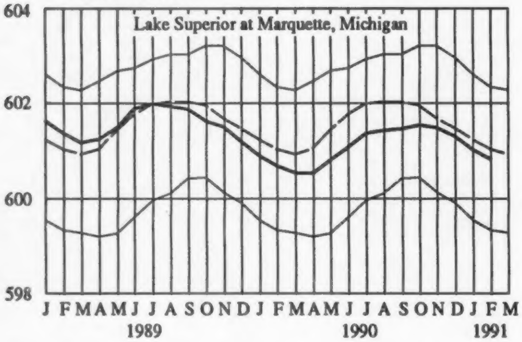
[1] 1 acre-foot = 0.04356 million cubic feet = 0.326 million gallons = 0.504 cubic feet per second per day.

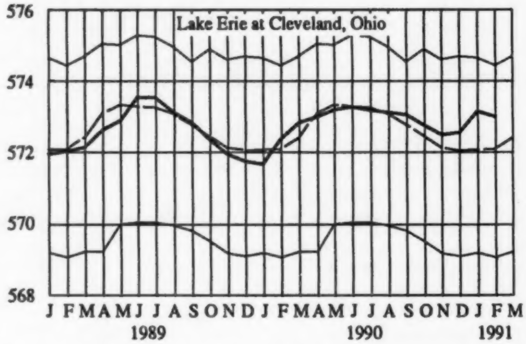
[2] Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage).

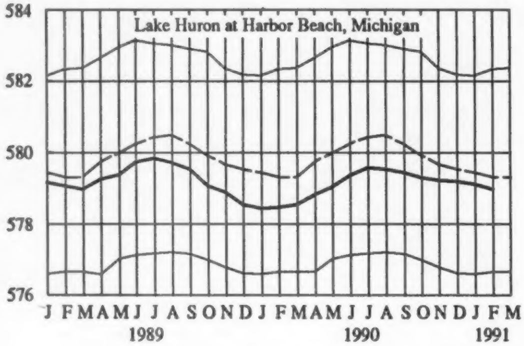
GREAT LAKES ELEVATIONS

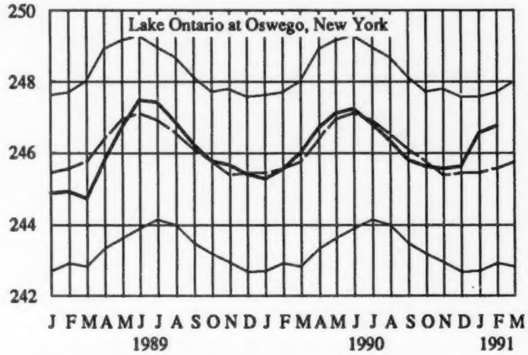
Area between light-weight solid lines indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period, 1951-80. Heavy line indicates mean for current period. Data from National Ocean Service.

ELEVATION, IN FEET ABOVE NATIONAL GEODETIC VERTICAL DATUM OF 1929

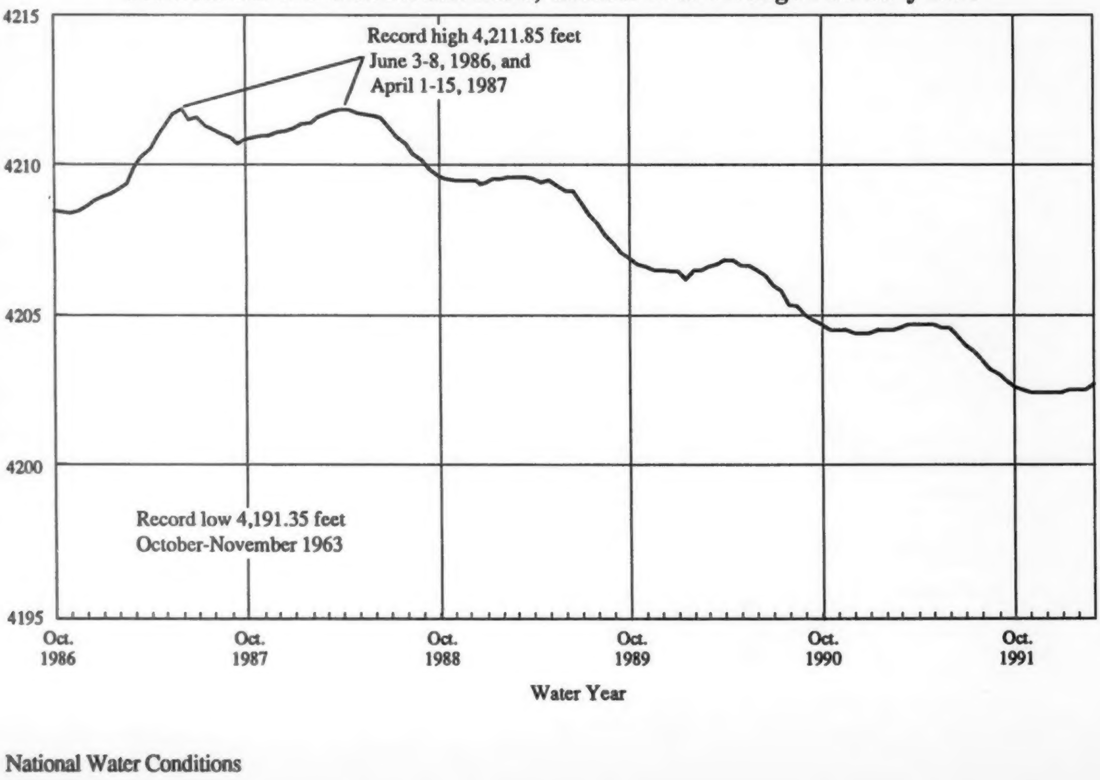




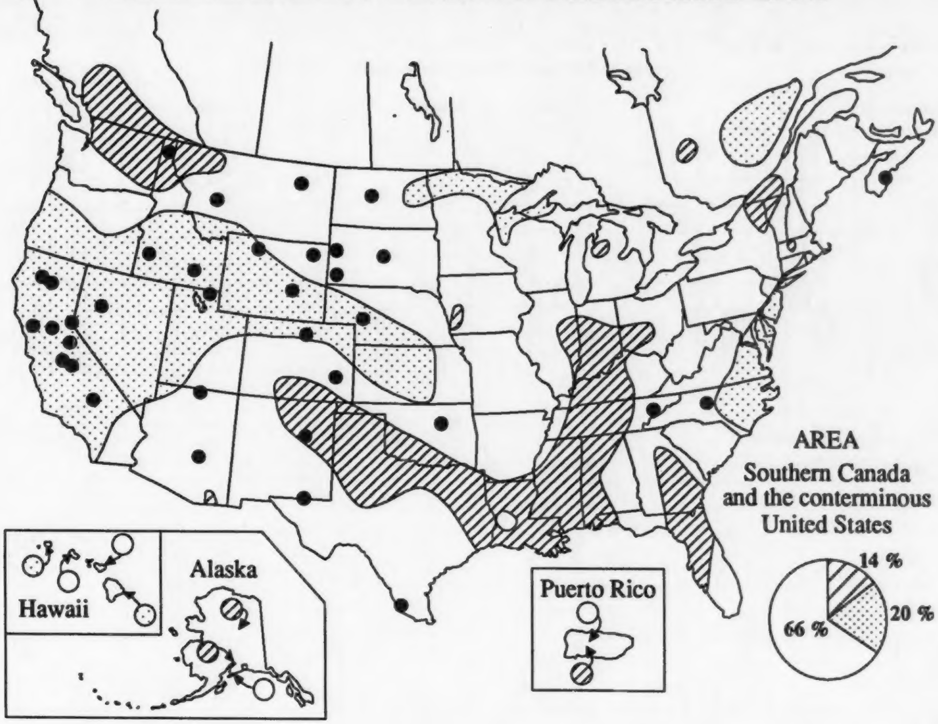




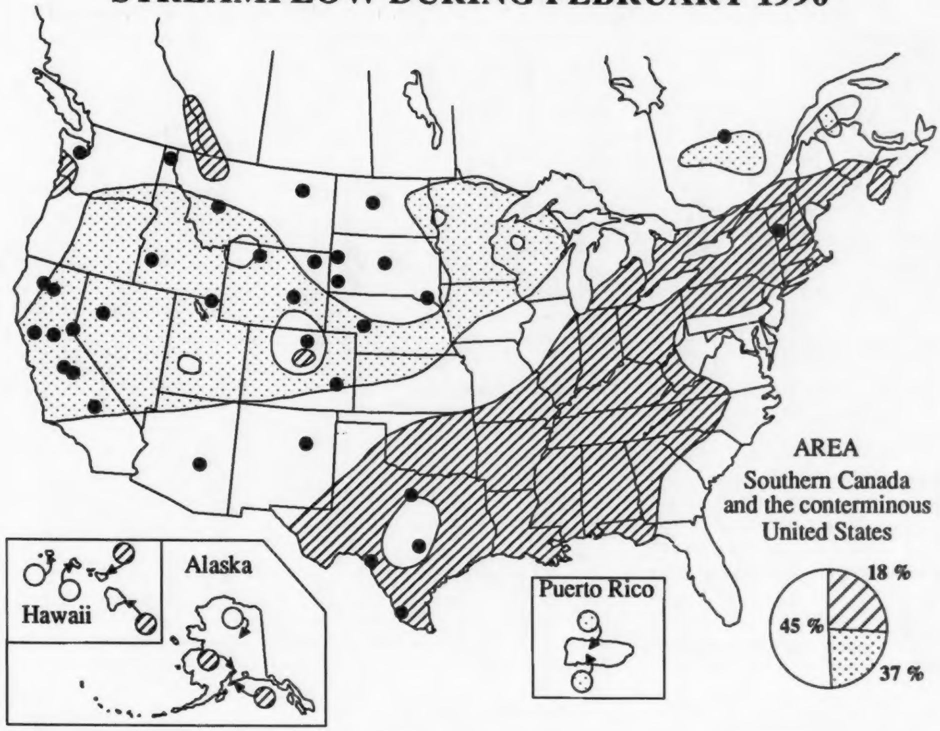
Fluctuations of the Great Salt Lake, October 1985 through February 1991



STREAMFLOW DURING FEBRUARY 1991

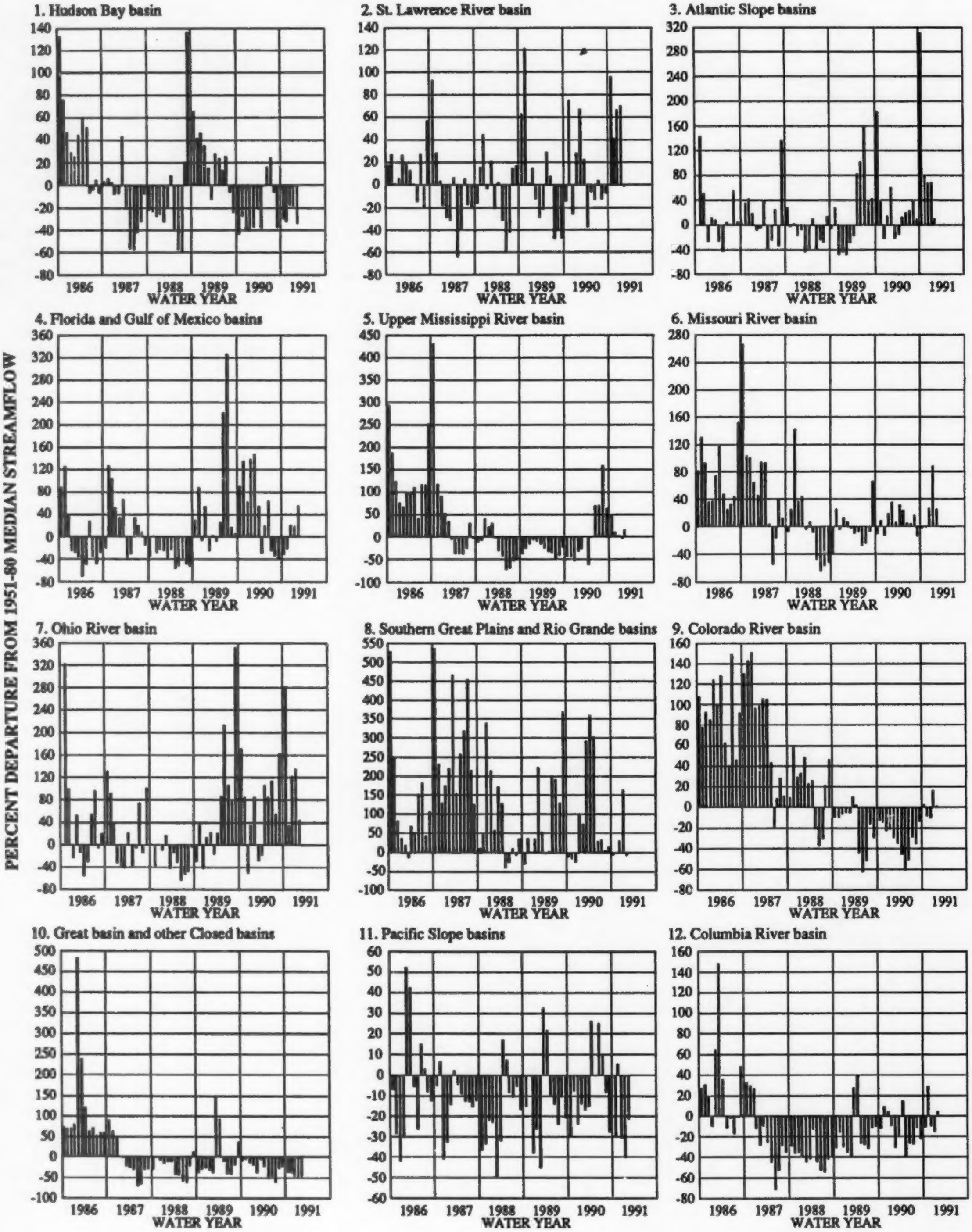


STREAMFLOW DURING FEBRUARY 1990

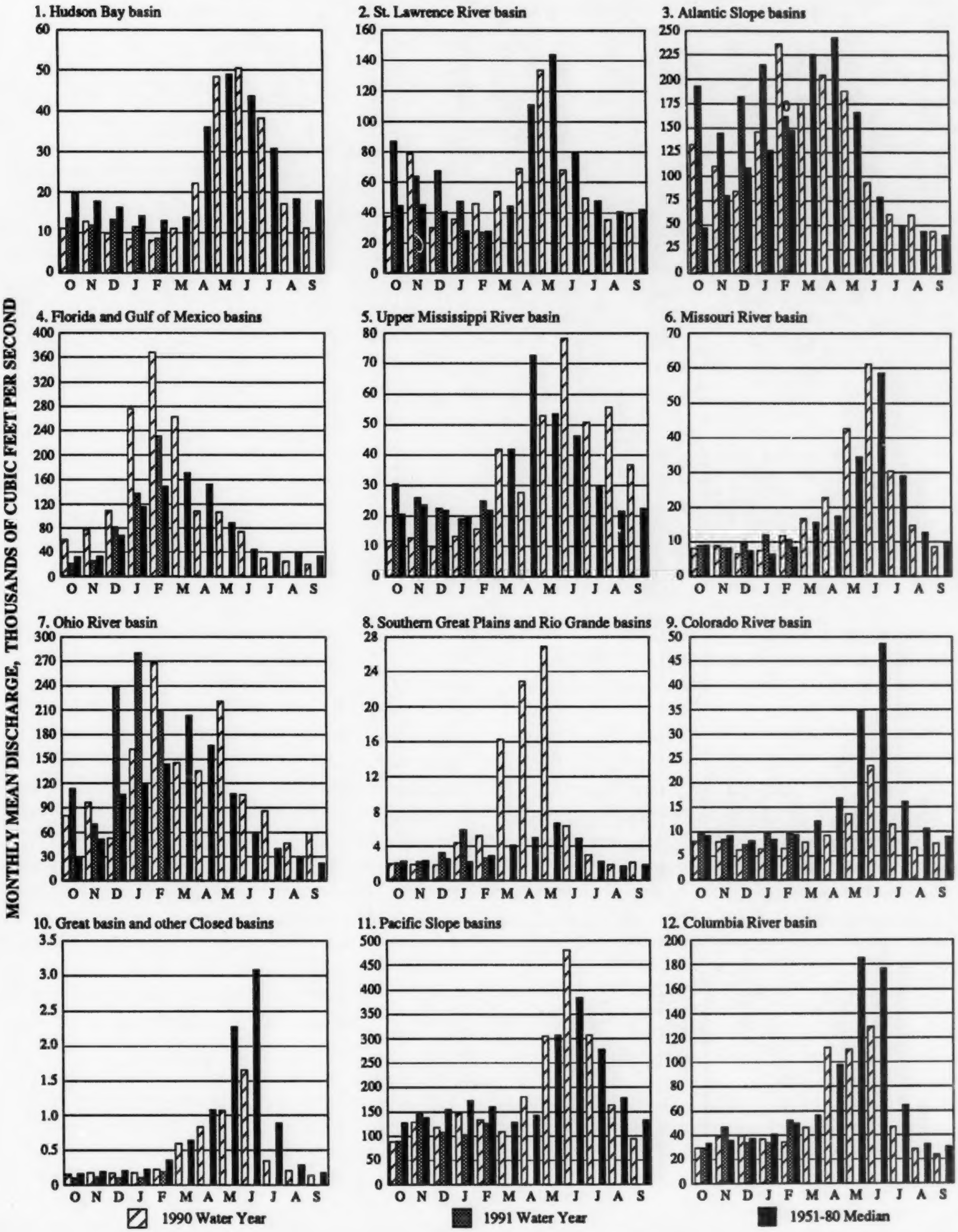


Above-normal range   Below-normal range   ● Below-average reservoir storage

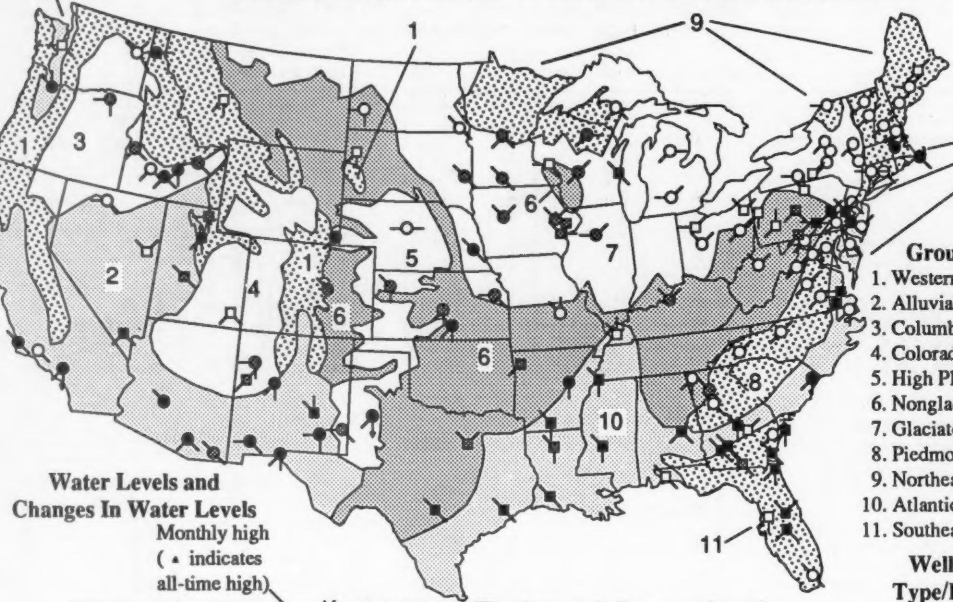
MONTHLY DEPARTURE OF ACTUAL STREAMFLOW (OCTOBER 1985-FEBRUARY 1991) FROM MEDIAN STREAMFLOW (1951-80)



ACTUAL MONTHLY STREAMFLOW, 1990 AND 1991 WATER YEARS, COMPARED WITH MEDIAN MONTHLY STREAMFLOW, 1951-80



GROUND-WATER CONDITIONS DURING FEBRUARY 1991



Ground-Water Regions

1. Western Mountain Ranges
2. Alluvial Basins
3. Columbia Lava Plateau
4. Colorado Plateau and Wyoming Basin
5. High Plains
6. Nonglaciated Central Region
7. Glaciated Central Region
8. Piedmont and Blue Ridge
9. Northeast and Superior Uplands
10. Atlantic and Gulf Coastal Plain
11. Southeast Coastal Plain

Water Levels and Changes In Water Levels

Monthly high (▴ indicates all-time high)
Higher than last month
About the same as last month
Lower than last month
Above average
About average
Below average
Monthly low (▾ indicates all-time low)

(The absence of all arms on the well symbol indicates that no data are available this month. The absence of arms on the left side of the symbol indicates that no data were available last month.)

Well Location/Aquifer Type/Pumpage Near Well

- ○ Water-table (unconfined) aquifer
- □ Artesian (confined) aquifer
- □ ○ Little or no withdrawal from aquifer
- ■ ● Moderate withdrawal from aquifer
- ■ ● Heavy withdrawal from aquifer

Ground-water levels in the Western Mountain Ranges were mixed with respect to last month and with respect to long-term averages. A February low occurred in the well in Montana.

In the Alluvial Basins, levels were also mixed with respect to last month's levels. Levels generally remained below average in the Region except in Oregon and parts of Nevada and New Mexico where they were above average. February lows occurred in wells in Utah , New Mexico and Texas and highs occurred in wells in Oregon and New Mexico. (See new extremes table on page 20 for data on these and other wells with new extremes). An all-time low level occurred for the second consecutive month in the alluvial sand and gravel aquifer at Baldwin Park, California .

In the Columbia Lava Plateau, water levels were at or below last month's levels and remained below long-term averages throughout the Region. February lows occurred in wells in Idaho and Oregon.

In the Colorado Plateau and Wyoming Basin, ground-water levels were at or below last month's levels and mixed with respect to long-term averages. A February low occurred in a well in New Mexico.

In the High Plains Region, water levels were mixed with respect to last month's and remained generally below long-term averages. Despite a rise in level since last month, a February low occurred in a well in Kansas. An all-time low occurred in the Ogallala aquifer well near Lubbock, Texas for the fifth consecutive month.

Water levels in the Non-glaciated Central Region were mixed with respect to last month's levels. Levels were generally below long-term averages in the northern and western states, and above average in the southern and eastern states with the exception of Georgia where they were below average. February lows occurred in wells in the Dakotas, Kansas, and Georgia and monthly highs occurred in wells in Missouri and Pennsylvania.

In the Glaciated Central Region, levels were above last month's in the Dakotas, Minnesota, Nebraska, and Iowa and mixed with respect to last month's levels elsewhere. Water levels were below long-term averages in the Dakotas, Minnesota, Nebraska, Kansas and New Jersey; mixed with respect to average in Iowa, Michigan and Wisconsin; and above average elsewhere. A February low occurred in a well in Iowa and a high occurred in a well in Pennsylvania.

In the Piedmont and Blue Ridge water levels were above last month's levels in Georgia, mixed with respect to last month in North Carolina, and below last month's levels elsewhere. Levels were above long-term averages in North

Provisional data; subject to revision

WATER LEVELS IN KEY OBSERVATION WELLS IN SOME REPRESENTATIVE AQUIFERS IN THE CONTERMINOUS UNITED STATES–FEBRUARY 1991

GROUND–WATER REGION Aquifer and Location	Aquifer type and local aquifer pumpage	Depth of well in feet	Water level in feet below land–surface datum	Departure from average in feet	Net change in water level in feet since: Last month	Last year	Year records began	Remarks
WESTERN MOUNTAIN RANGES (1)								
Rathdrum Prairie aquifer near Athol, northern Idaho	●	485	462.4	–0.1	–0.1	5.0	1929	
ALLUVIAL BASINS (2)								
Alluvial valley fill aquifer in Steptoe Valley, Nevada	□	122	7.71	4.25	.19	–.70	1949	
Alluvial sand and gravel aquifer, Baldwin Park, California	●	200	188.28	–69.92	–.90	–9.10	1932	All–time low
Valley fill aquifer, Elfrida area near Douglas, Arizona	●	124	100.41	–18.62	.11	–1.33	1947	
Hueco bolson aquifer at El Paso, Texas	●	640	271.13	–21.34	–.67	–1.48	1964	Feb. low
COLUMBIA LAVA PLATEAU (3)								
Snake River Plain aquifer near Eden, Idaho	●	208	128.5	–7.5	–1.9	–1.6	1962	
Columbia River basalt aquifer, Pendleton, Oregon	●	1,501	218.07	–27.05	–.02	–3.21	1965	Feb. low
COLORADO PLATEAU AND WYOMING BASIN (4)								
Dakota aquifer near Blanding, Utah	□	140	47.94	–1.29	–.61	–5.60	1960	
HIGH PLAINS (5)								
Wind–blown sand deposits of the High Plains aquifer system near Dunning, Nebraska	○	13	3.59	–.07	.01	.16	1934	
Southern High Plains aquifer, Lovington, New Mexico	●	212	59.60	–5.81	.07	.08	1971	
NON–GLACIATED CENTRAL REGION (6)								
Sentinel Butte aquifer near Dickinson, North Dakota	○	160	21.16	–2.51	.03	–1.12	1968	Feb. low
Sand and gravel Pleistocene aquifer near Valley Center, Kansas	●	54	20.40	–2.71	–.20	–.79	1937	Feb. low
Glacial outwash sand and gravel aquifer near Louisville, Kentucky	●	94	17.43	7.37	.32	1.38	1945	
Upper Pennsylvanian aquifer in the Central Appalachians Plateau near Glenville, West Virginia	○	25	15.05	.83	.20	–.96	1953	
GLACIATED CENTRAL REGION (7)								
Fluvial sand and gravel aquifer, Platte River Valley, near Ashland, Nebraska	●	12	6.65	–1.34	.67	–.22	1933	
Sheyenne Delta aquifer near Wyndmere, North Dakota	○	40	8.84	–1.79	.12	.04	1963	
Pleistocene (glacial drift) aquifer at Princeton in northern Illinois	●	29	6.25	4.99	.10	.33	1942	
Shallow drift aquifer near Roscommon in north–central part of Lower Peninsula, Michigan	○	14	4.99	–.02	–.19	.83	1934	
Silurian–Devonian carbonate aquifer near Dola, Ohio	□	51	6.22	1.73	–.05	.26	1954	
PIEDMONT AND BLUE RIDGE (8)								
Water–table aquifer in Petersburg Granite, southeastern Piedmont, Colonial Heights, Virginia	○	100	14.67	.10	–.88	–.95	1939	
Weathered granite aquifer, western Piedmont, Mocksville area, North Carolina	○	31	14.96	4.39	–.56	–1.15	1981	
Surficial aquifer at Griffin, Georgia	○	30	17.33	–3.25	2.10	–4.32	1943	
NORTHEAST AND SUPERIOR UPLANDS (9)								
Pleistocene glacial outwash aquifer, at Camp Ripley, near Little Falls, Minnesota	●	59	15.54	–2.0	–.21	.52	1949	
Glacial till aquifer at Augusta, Maine	○	22	6.20	.26	.02	–1.76	1960	
Shallow sand aquifer (glacial deposits), Acton, Massachusetts	●	34	17.98	.86	.51	.54	1965	
Pleistocene sand aquifer near Morrisville, Vermont	○	50	18.61	.05	–.67	–.05	1966	
ATLANTIC AND GULF COASTAL PLAIN (10)								
Columbia deposits aquifer near Camden, Delaware	○	11	6.80	–.65	–.18	–1.02	1950	
Memphis sand aquifer near Memphis, Tennessee	■	384	107.33	–16.78	.21	.82	1940	Feb. low
Eutaw aquifer in the City of Montgomery, Alabama	■	270	26.1	–6.4	–.8	–5.9	1952	
Evangeline aquifer at Houston, Texas	■	1,152	306.41	–8.70	1.31	–4.43	1978	
SOUTHEAST COASTAL PLAIN (11)								
Upper Floridan aquifer on Cockspur Island, Savannah area, Georgia	■	348	36.73	–10.13	–3.82	–2.02	1956	Feb. low
Upper Floridan aquifer, Jacksonville, Florida	■	905	–20.8	–6.5	.4	–.6	1930	Feb. low
Biscayne aquifer near Homestead, Florida	○	20	8.24	–1.66	–.26	.46	1932	

Carolina, mixed with respect to average in Virginia and below average elsewhere.

In the Northeast and Superior Uplands, levels were at or below last month's levels except in Massachusetts. Levels were at or below long-term averages in Minnesota, Wisconsin, Michigan, and parts of New Hampshire, and above average elsewhere.

In the Atlantic and Gulf Coastal Plain, levels declined from last month or remained the same in Massachusetts, Delaware, Virginia, the Carolinas, Alabama, and Missis-

NEW EXTREMES DURING FEBRUARY 1991 AT GROUND-WATER INDEX STATIONS

WRD Station Identification Number	Aquifer and Location	Aquifer type and local aquifer pumpage	Depth of well	Years of record	Previous February Record: Average	Previous February Record: Extreme (year)	February 1991
					End-of-month water level in feet below land surface datum		
	LOW WATER LEVELS						
	WESTERN MOUNTAIN RANGES						
463906112043901	Cretaceous aquifer near Helena, Montana	□	110	14	29.75	32.37 (1978)	35.26
	ALLUVIAL BASINS						
315212106245101	Hueco bolson aquifer at El Paso, Texas	●	640	26	249.79	269.65 (1990)	271.13
324340104231701	Roswell Basin shallow aquifer at Dayton, New Mexico	●	250	39	91.66	122.60 (1987)	122.70
340535117573501	Alluvial sand and gravel aquifer at Baldwin Park, California	●	200	38	118.36	179.18 (1990)	[1]188.28
351051106395301	Basin fill aquifer at Albuquerque, New Mexico	●	980	7	31.65	33.99 (1990)	35.25
403803111505301	Basin fill aquifer near Holladay, Utah	■	165	12	60.80	75.00 (1990)	77.98
414501111520001	Basin fill aquifer near Logan, Utah	▩	43	50	17.7	12.6 (1989)	12.6
	COLUMBIA LAVA PLATEAU						
424053113412801	Snake River Plain aquifer near Rupert, Idaho	●	194	40	150.4	157.3 (1982)	159.3
453934118491701	Columbia River basalts aquifer at Pendleton, Oregon	◍	1,501	25	191.02	214.87 (1990)	218.07
	COLORADO PLATEAU AND WYOMING BASIN						
352023107473201	Westwater Canyon aquifer near Grants–Bluewater, New Mexico	◍	155	35	68.11	71.90 (1984)	78.19
	HIGH PLAINS						
341010102240801	Ogallala aquifer near Lubbock, Texas	●	202	40	56.74	89.17 (1990)	[1]91.58
392329101040201	Ogallala aquifer near Colby, Kansas	◍	175	43	118.48	128.44 (1990)	129.36
	NON–GLACIATED CENTRAL REGION						
345403085160001	Paleozoic rock aquifer at Fort Oglethorpe, Georgia	○	72	13	9.72	11.67 (1981)	11.75
375039097234201	Sand and gravel Pleistocene aquifer near Valley Center, Kansas	●	54	53	17.69	20.35 (1957)	20.40
375810097324301	Equus aquifer near Halstead, Kansas	◍	57	51	22.15	31.83 (1990)	36.40
441759103261201	Minnelusa aquifer near Tilford, South Dakota	□	302	5	27.41	47.36 (1990)	56.68
465755102410701	Sentinel Butte aquifer near Dickinson, North Dakota	○	160	22	18.65	20.04 (1990)	21.16
	GLACIATED CENTRAL REGION						
415534091251502	Cambrian–Ordovician aquifer at Mt. Vernon, Iowa	▩	1,557	3	336.11	337.98 (1990)	338.24
462633097163402	Sheyenne Delta aquifer near Wyndmere, North Dakota	○	40	27	7.04	8.88 (1990)	8.84
	ATLANTIC AND GULF COASTAL PLAIN						
321945090152201	Sparta aquifer system at Jackson, Mississippi	■	852	46	257.62	304.46 (1990)	307.79
322357092341701	Sparta aquifer near Ruston, Louisiana	▩	703	16	222.59	235.27 (1990)	236.59
323302083263401	Dublin aquifer system at Tarversville, Georgia	■	616	15	163.63	164.99 (1989)	165.07
331438092411901	Sparta aquifer near El Dorado, Arkansas	■	540	35	318.11	350.20 (1969)	352.00
335115079033500	Pee Dee aquifer at Collins Park at Conway, South Carolina	■	438	16	33.92	59.83 (1990)	62.08
344607091543401	Mississippi Valley alluvial aquifer near Lonoke, Arkansas	●	135	15	106.79	115.38 (1990)	115.61
350900089482300	Memphis sand aquifer near Memphis, Tennessee	■	384	50	90.55	106.51 (1990)	107.33
353219077153801	Surficial aquifer near Simpson, North Carolina	○	12	14	2.85	3.70 (1988)	4.09
364059076544901	Middle Potomac aquifer at Franklin, Virginia	■	305	30	167.25	196.17 (1989)	209.09
372506076511703	Upper Potomac aquifer near Toano, Virginia	■	401	5	155.20	161.03 (1990)	162.21
	SOUTHEAST COASTAL PLAIN						
281715082164401	Upper Floridan aquifer near San Antonio, Florida	□	150	26	39.19	45.36 (1985)	50.69
302304081383202	Upper Floridan aquifer at Jacksonville, Florida	■	905	60	–27.3	–21.0 (1989)	–20.8
320202080541201	Upper Floridan aquifer on Cockspur Island near Savannah, Georgia	■	348	35	26.60	34.71 (1990)	36.73
	HIGH WATER LEVELS						
	ALLUVIAL BASINS						
332615104303601	Roswell Basin artesian aquifer at Roswell, New Mexico	■	324	24	52.56	39.67 (1990)	38.10
452938122254801	Troutdale aquifer near Portland, Oregon	●	715	27	101.91	100.29 (1978)	87.81
	NON–GLACIATED CENTRAL REGION						
375749091475001	Ozark aquifer near Rolla, Missouri	○	450	2	348.58	347.69 (1989)	344.59
402138079031802	Shale aquifer at State Game Land 42, Pennsylvania	□	110	23	17.06	22.34 (1968)	14.28
414513077333701	Sandstone aquifer near Gaines, Pennsylvania	□	77	18	33.04	32.08 (1976)	31.77
	ATLANTIC AND GULF COASTAL PLAIN						
365210088391301	Claiborne aquifer near Viola, Kentucky	□	106	39	14.21	10.28 (1989)	9.50

[1] All-tme month-end low.

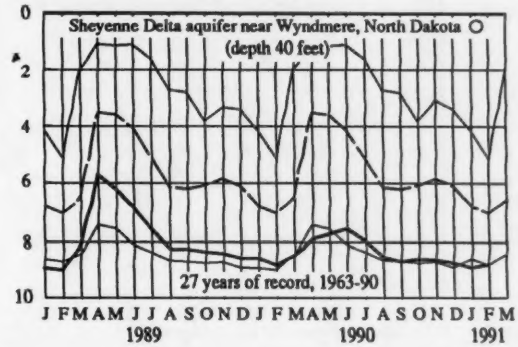
[2] All-tme month-end high.

sippi, and rose elsewhere. Water levels were above long-term averages in Kentucky; mixed in New Jersey and Georgia; and below average elsewhere. February lows occurred in wells in Virginia, the Carolinas, Georgia, Mississippi, Tennessee, Arkansas and Louisiana. (See graphs on page 21.) Level rose to a February high in a well in Kentucky.

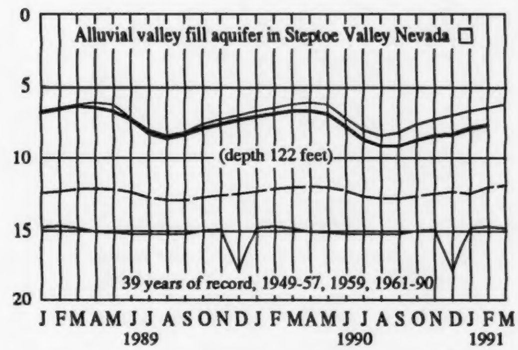
In the Southeastern Coastal Plain, water levels were above last month's levels in much of Georgia, but mixed in Florida. Levels were generally below long-term averages in Georgia and Florida. February lows occurred in one well in Georgia and two wells in Florida.

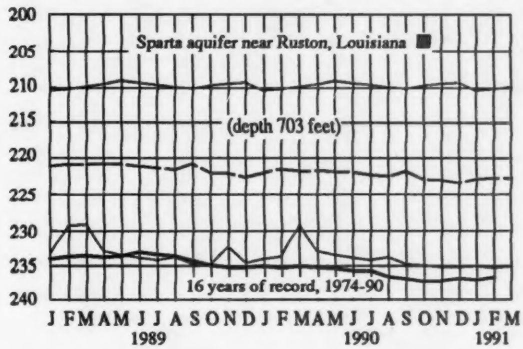
MONTHEND GROUND-WATER LEVELS IN SELECTED WELLS

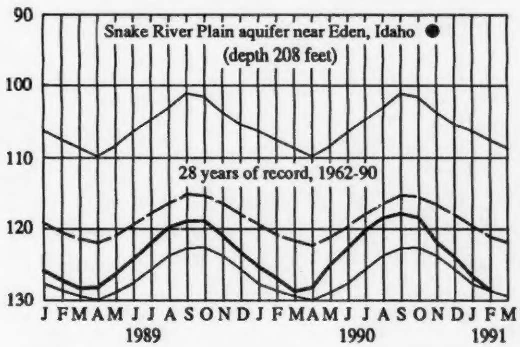
Area between light-weight solid lines indicates range between highest and lowest record for the month. Dashed line indicates average of monthly levels in previous years. Heavy line indicates level for current period.

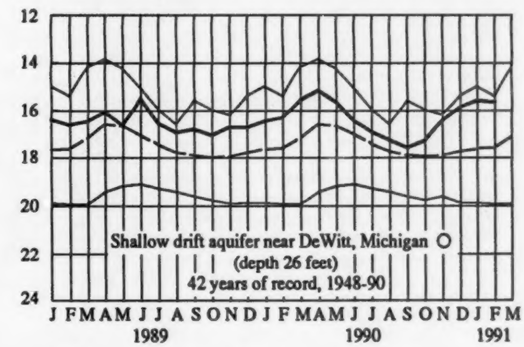


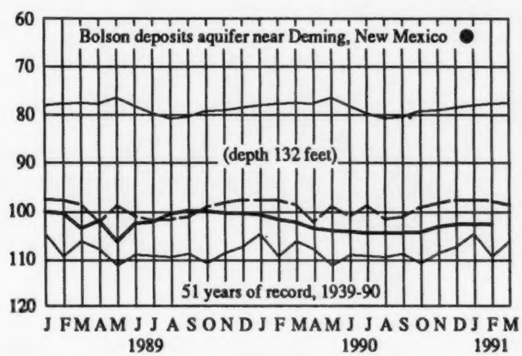
WATER LEVEL, FEET BELOW LAND-SURFACE DATUM

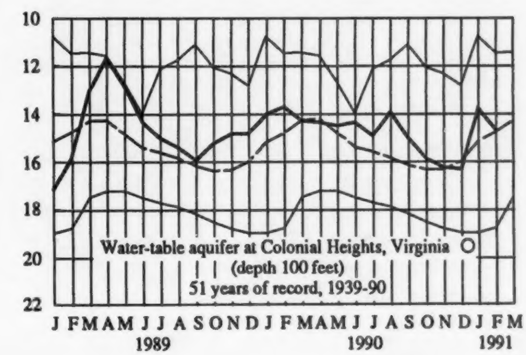


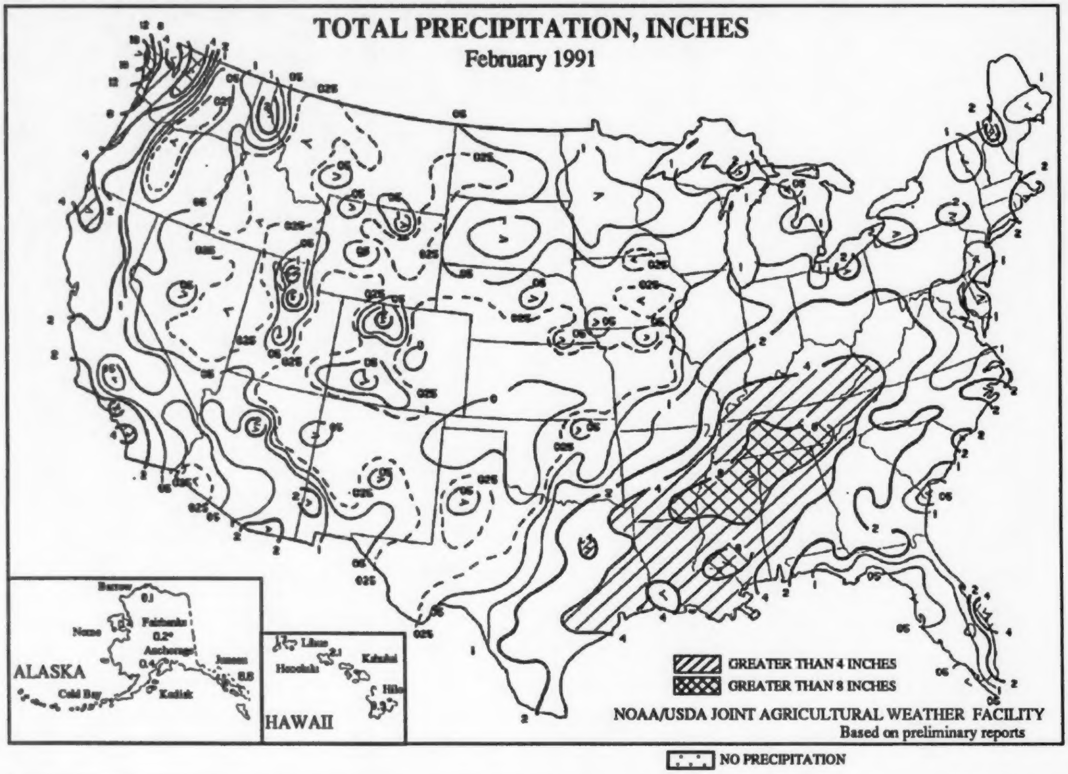


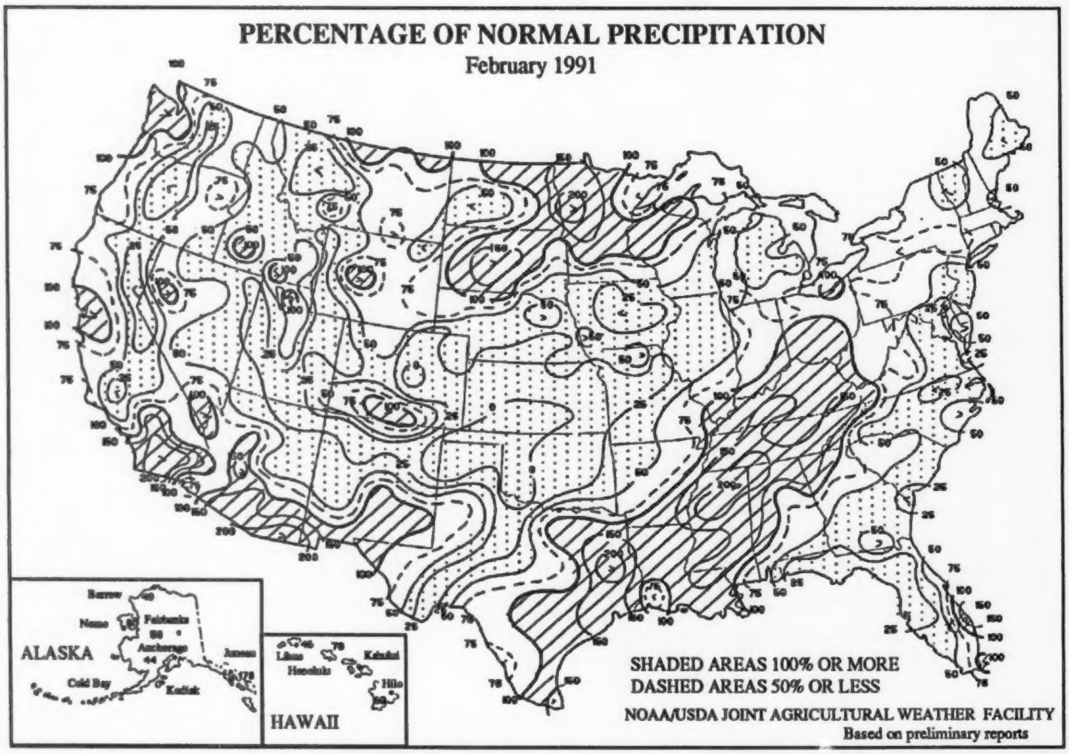












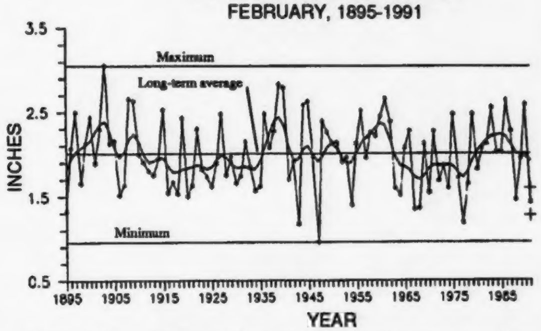
(From *Weekly Weather and Crop Bulletin* prepared and published by the NOAA/USDA Joint Agricultural Facility)

UNITED STATES FEBRUARY CLIMATE IN HISTORICAL PERSPECTIVE

(From Climate Perspectives Branch, Global Climate Lab, NCDC, NOAA)

Preliminary data for February 1991 indicate that temperature averaged across the contiguous United States was much above the long-term mean. February 1991 ranked as the third warmest February on record (the record begins in 1895). The 1991 value is based on preliminary data, which has been shown to be within 0.25° F of the final data over a 22-month period.

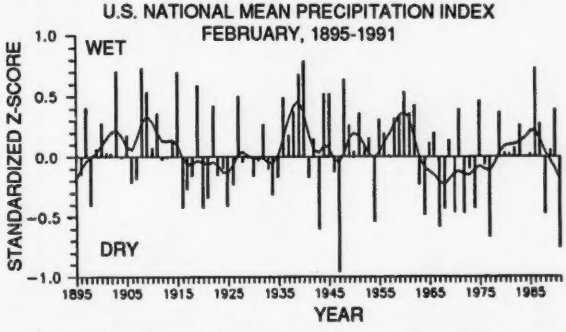
U.S. NATIONAL PRECIPITATION
FEBRUARY, 1895-1991



Areally-averaged precipitation for the nation was considerably below the long-term mean (graph above), ranking February 1991 as the eighth driest February on record. The preliminary value for precipitation is estimated to be accurate to within 0.16 inches and the confidence interval is plotted in Figure 2 as a '+'.

Historical precipitation is shown in a different way below. The February precipitation for each climate division in the contiguous U.S. was first standardized using the gamma distribution over the 1951-80 period. These gamma-standardized values were then weighted by area and averaged to determine a national standardized precipitation value. Negative values are dry, positive are wetter than the mean. This index gives a more accurate indication of how precipitation across the country compares to the local normal climate. The areally-weighted mean standardized national precipitation ranks February 1991 as the second driest February on record. The filtered curves in both graphs suggest that February of the last four years has generally been drier than February of the early to mid 1980's.

U.S. NATIONAL MEAN PRECIPITATION INDEX
FEBRUARY, 1895-1991



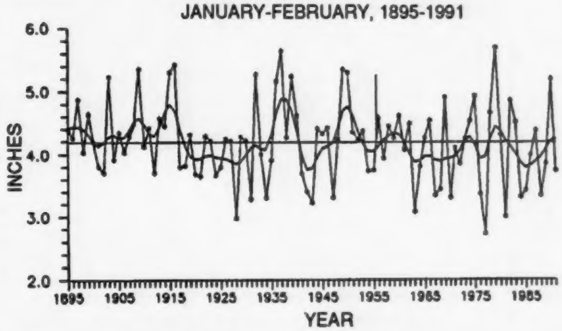
Temperatures were above normal across the entire country, with all regions ranking in the upper third of the historical distribution. The Northwest region had the warmest February on record in 1991, while the West North Central region ranked second warmest and West third warmest. According to National Weather Service records, over 270 daily record high temperatures were reported during the month. Precipitation in all regions was near to below normal, with the driest regions stretching across the northern and eastern fringes of the country. The Northeast region had the sixth driest February on record, and West North Central the tenth driest.

About a fourth of the contiguous United States continued to experience severe to extreme long-term drought during February 1991, while approximately a tenth continued severely to extremely wet. Twelve other Februarys have had a larger drought area than February 1991. The severe drought area stretched mainly from the West to the northern plains. A large part of the Spring Wheat Belt (basically the northern Plains and northwest interior valleys) has been in severe to extreme long-term drought for the last four years.

Growing season precipitation for the Primary Hard Red Winter Wheat belt (extending roughly from Nebraska to the Texas panhandle) has been below normal this year, with October-February 1990-91 ranking as the 20th driest such period on record. The last four years have had subnormal precipitation for this period, contrasting sharply with the early to mid-1980's.

The year so far, for the nation as a whole, has been unusually warm, with January-February 1991 ranking as the eleventh warmest January-February period on record.

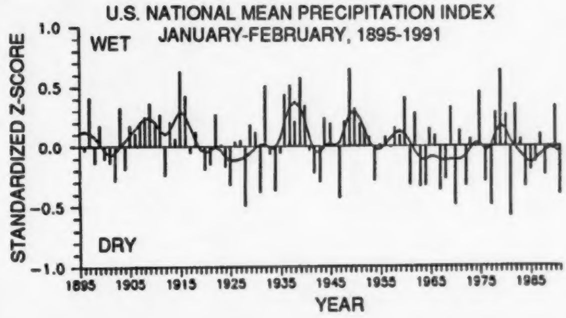
U.S. NATIONAL PRECIPITATION
JANUARY-FEBRUARY, 1895-1991

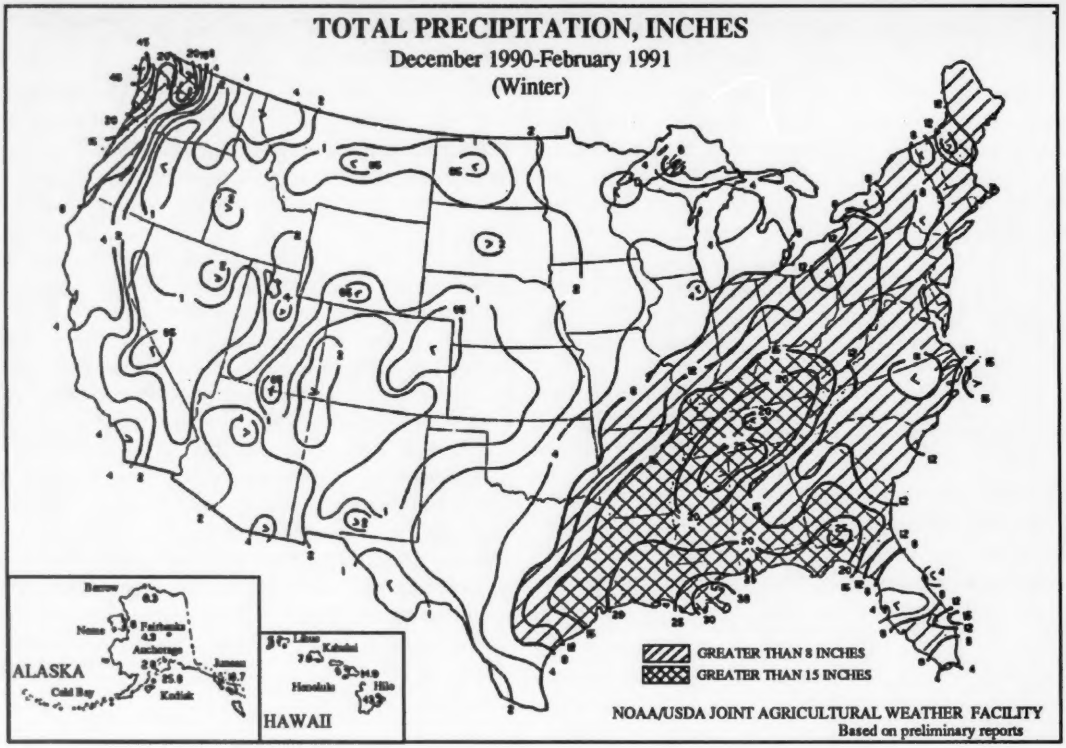


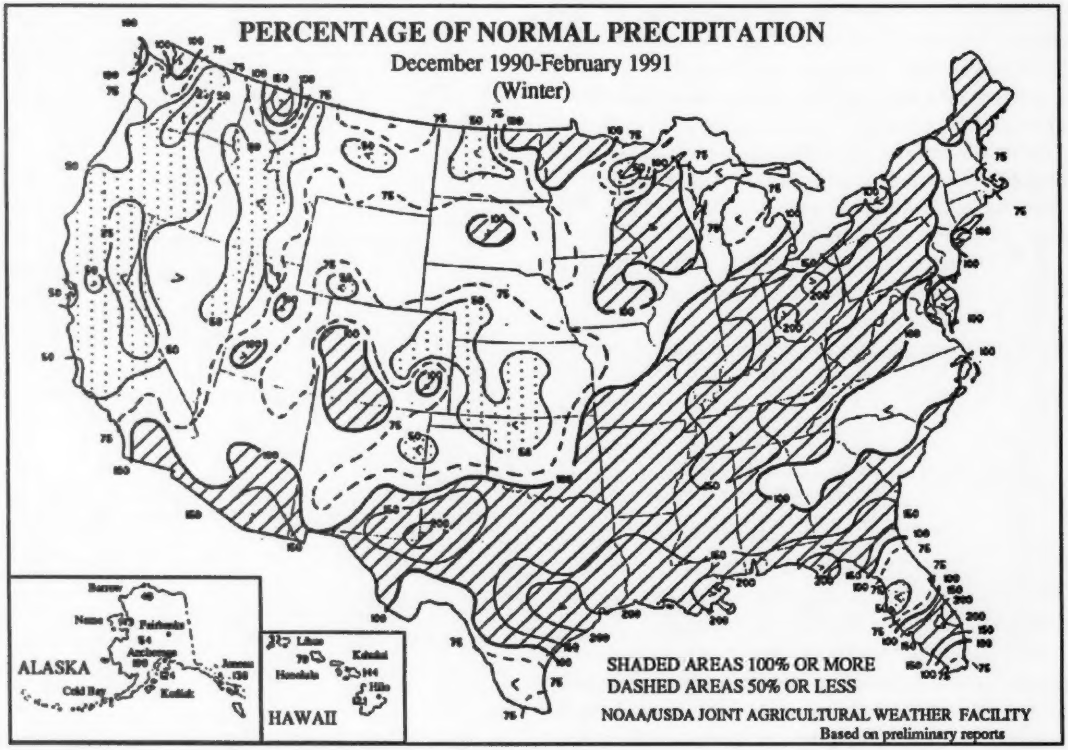
January-February 1991 precipitation averaged below normal, ranking at the 24th driest such period (graph above).

When the local normal climate is taken into account, however, 1991 ranked as the sixth driest January-February period on record (graph below), with 29.6% of the country experiencing much below normal precipitation.

U.S. NATIONAL MEAN PRECIPITATION INDEX
JANUARY-FEBRUARY, 1895-1991





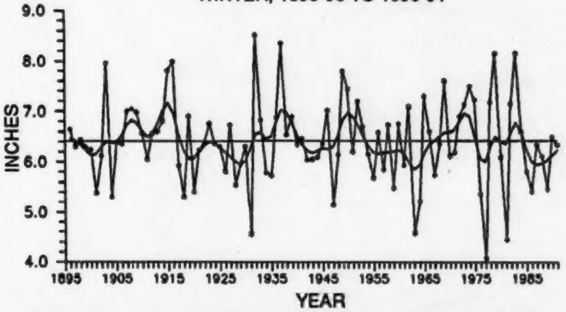


(From *Weekly Weather and Crop Bulletin* prepared and published by the NOAA/USDA Joint Agricultural Facility)

UNITED STATES WINTER CLIMATE IN HISTORICAL PERSPECTIVE

(From Climate Perspectives Branch, Global Climate Lab, NCDC, NOAA)

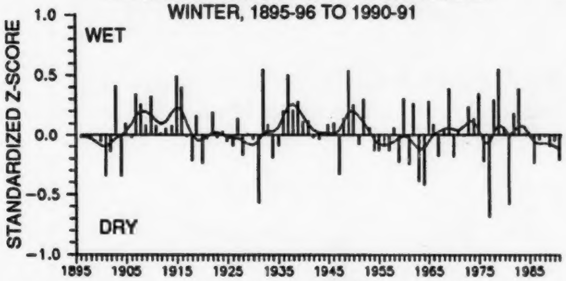
U.S. NATIONAL PRECIPITATION
WINTER, 1895-96 TO 1990-91



Preliminary data for Winter (December-February) 1990-91 indicate that precipitation for the nation was near the long-term mean (graph above), ranking Winter 1990-91 as the 44th driest winter on record. The last seven years have been consistently near or below the long term mean, resulting in a generally dry filter curve.

Historical precipitation is shown in a different way in the graph below. The Winter precipitation for each climate division in the contiguous U.S. was first standardized using the gamma distribution over the 1951-80 period. These gamma-standardized values were then weighted by area and averaged to determine a national standardized precipitation value. Negative values are dry, positive are wetter than the mean. This index gives a more accurate indication of how precipitation across the country compares to the local normal climate. The areally-weighted mean standardized national precipitation ranks Winter 1990-91 as the 15th driest winter on record.

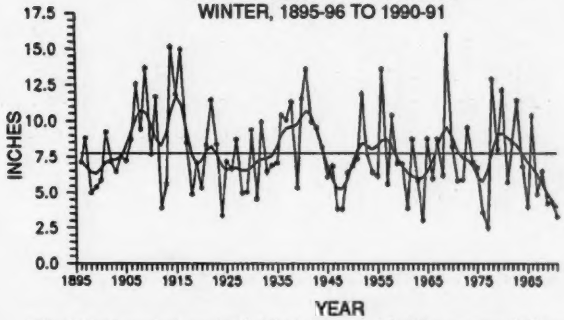
U.S. NATIONAL MEAN PRECIPITATION INDEX
WINTER, 1895-96 TO 1990-91



When looking at the nation as a whole, nearly two-thirds (63.2%) of the country had a drier than normal winter for 1990-91 while only one-third (36.8%) was wetter than normal. Looking closer, one-fifth (20.6%) of the country had a much drier than normal winter season. Approximately two-thirds of the nation (60.6%) experienced warmer than normal temperatures for the winter season with fully ten percent averaging much warmer than normal. Cold temperatures were a factor in December but when the entire winter season is considered, only 39.4% of the country was colder than normal and only 3.8% was much colder than normal.

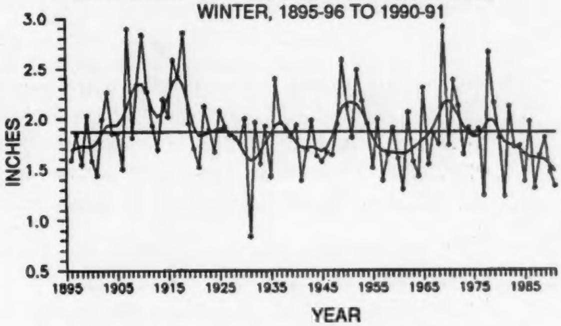
Perhaps of greatest significance is the continuing drought of the western regions, conditions for which are shown below.

WEST REGION PRECIPITATION
WINTER, 1895-96 TO 1990-91



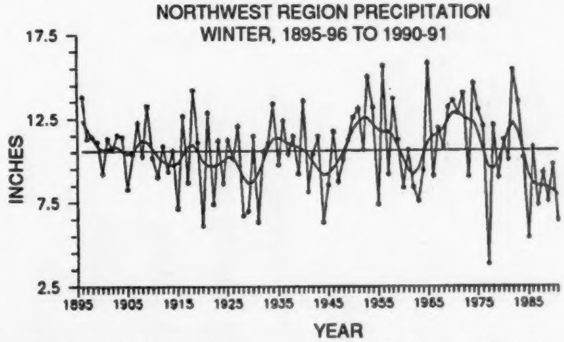
The West region ranked third driest with this season being the fifth consecutive dry winter. Longterm conditions, as indicated by the filter curve, have reached alarmingly low levels.

WEST NORTH CENTRAL REGION PRECIPITATION
WINTER, 1895-96 TO 1990-91



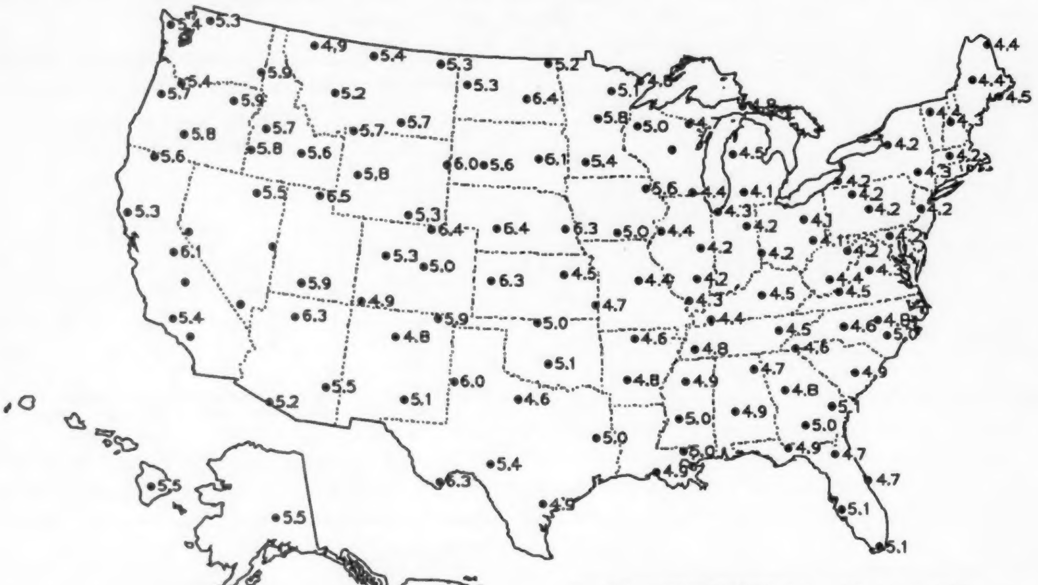
In the West North Central region, ten of the last twelve winters have averaged below normal precipitation and the filter curve has been showing a general decreasing tendency for the last 20 years.

NORTHWEST REGION PRECIPITATION
WINTER, 1895-96 TO 1990-91



Precipitation in the Northwest region of the United States has been below normal for seven of the last eight years. The filter curve dramatically shows how the last eight years contrast to the conditions of the prior decades.

pH of Precipitation for January 21-February 24, 1991

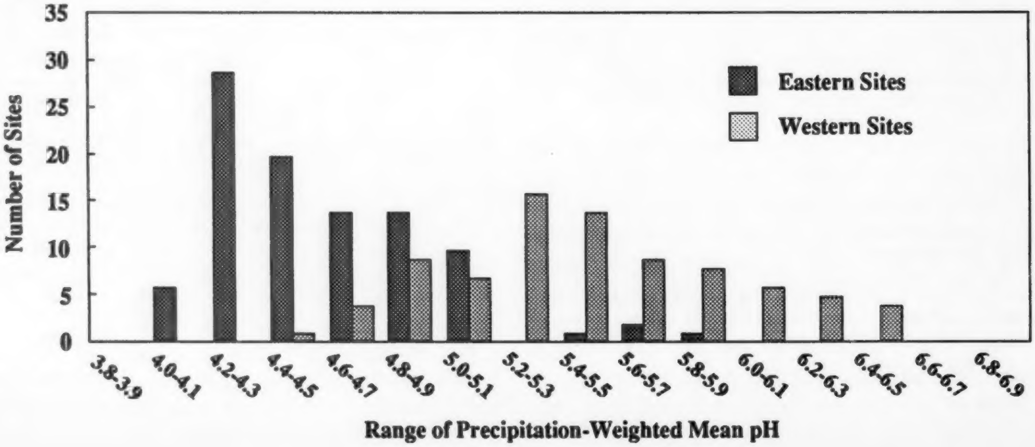


Provisional NADP/NTN data; subject to revision

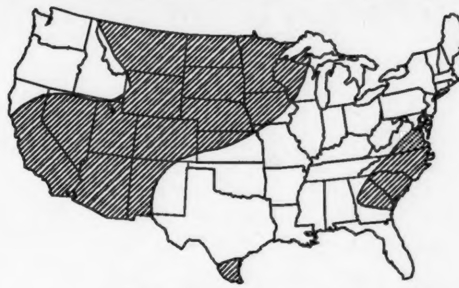
Current pH data shown on the map (• 4.9) are precipitation-weighted means calculated from preliminary laboratory results provided by the NADP/NTN Central Analytical Laboratory at the Illinois State Water Survey and are subject to change. The 127 points (•) shown on this map represent a subset of all sites chosen to provide relatively even geographic spacing. Absence of a pH value at a site indicates either that there was no precipitation or that data for the site did not meet preliminary screening criteria for this provisional report.

A list of the approximately 200 sites comprising the total Network and additional data for the sites are available from the NADP/NTN Coordination Office, Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, CO 80523.

Distribution of precipitation-weighted mean pH for all NADP/NTN sites having one or more weekly samples for January 21 to February 24, 1991. The East/West dividing line is at the western borders of Minnesota, Iowa, Missouri, Arkansas, and Louisiana.



TEMPERATURE OUTLOOK FOR MARCH-MAY 1991



PRECIPITATION OUTLOOK FOR MARCH-MAY 1991

From *Monthly and Seasonal Weather Outlook* prepared and published by the National Weather Service

NATIONAL WATER CONDITIONS

FEBRUARY 1991

Based on reports from the Canadian and U.S. Field offices; completed April 3, 1991

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EXPLANATION OF DATA (Revised December 1990)

Cover map shows generalized pattern of streamflow for the month based on provisional data from 186 index gaging stations—18 in Canada, 166 in the United States, and 2 in the Commonwealth of Puerto Rico. Alaska, Hawaii, and Puerto Rico inset maps show streamflow only at the index gaging stations that are located near the point shown by the arrows. Classifications on map are based on comparison of streamflow for the current month at each index station with the flow for the same month in the 30-year reference period, 1951-80. Shorter reference periods are used for one Canadian index station, two Kansas index stations, and the Puerto Rico index stations because of the limited records available.

The ***streamflow ranges map*** shows where streamflow has persisted in the above- or below-normal range from last month to this month and also where streamflow is in the above- or below-normal range this month after being in a different range last month. Three ***pie charts*** show: the percent of stations reporting discharges in each flow range for both the conterminous United States and southern Canada, and also the percent of area in each flow range for the conterminous United States and southern Canada. The ***combination bar/line graph*** shows the percent departure of the total mean from the total median flow (1951-80) and the cumulative departure from median (in cfs) for all reporting stations (excluding eight large river stations indicated by * in the ***Flow of large rivers*** table) in the conterminous United States and southern Canada.

The comparative data are obtained by ranking the 30 flows for each month of the reference period in order of decreasing magnitude—the highest flow is given a ranking of 1 and the lowest flow is given a ranking of 30. Quartiles (25-percent points) are computed by averaging the 7th and 8th highest flows (upper quartile), 15th and 16th highest flows (middle quartile and median), and the 23rd and 24th highest flows (lower quartile). The upper and lower quartiles set off the highest and lowest 25 percent of flows, respectively, for the reference period. The median (middle quartile) is the middle value by definition. For the reference period, 50 percent of the flows are greater than the median, 50 percent are less than the median, 50 percent are between the upper and lower quartiles (in the normal range), 25 percent are greater than the upper quartile (above normal), and 25 percent are less than the lower quartile (below normal). Flow for the current month is then classified as: in the ***above-normal range*** if it is greater than the upper quartile, in the ***normal range*** if it is between the upper and lower quartiles, and in the ***below-normal range*** if it is less than the lower quartile. Change in flow from the previous month to the current month is classified as ***seasonal*** if the change is in the same direction as the change in the median. If the change is in the opposite direction of the change in the median, the change is classified as ***contraseasonal*** (opposite to the seasonal change). For example: at a particular index station, the January median is greater than the December median; if flow for the current January increased from December (the previous month), the increase is seasonal; if flow for the current January decreased from December, the decrease is contraseasonal.

Flood frequency analyses define the relation of flood peak magnitude to probability of occurrence or recurrence interval. ***Probability of occurrence*** is the chance that a given flood magnitude will be exceeded in any one year. ***Recurrence interval*** is the reciprocal of probability of occurrence and is the average number of years between occurrences. For example, a flood having a probability of occurrence of 0.01 (1 percent) has a recurrence interval of 100 years. ***Recurrence intervals imply no regularity of occurrence***; a 100-year flood might be exceeded in consecutive years or it might not be exceeded in a 100-year period.

Statements about ***ground-water levels*** refer to conditions near the end of the month. The water level in each observation well is compared with average level for the end of the month determined from the entire period of record for that well. ***Changes in ground-water levels***, unless described otherwise, are from the end of the previous month to the end of the current month.

Dissolved solids and temperature data are given for five stream-sampling sites that are part of the National Stream Quality Accounting Network (NASQAN). ***Dissolved solids*** are minerals dissolved in water and usually consist predominately of silica and ions of calcium, magnesium, sodium, potassium, carbonate, bicarbonate, sulfate, chloride, and nitrate. ***Dissolved-solids discharge*** represents the total daily amount of dissolved minerals carried by the stream. ***Dissolved-solids concentrations*** are generally higher during periods of low streamflow, but the highest dissolved-solids discharges occur during periods of high streamflow because the total quantities of water, and therefore total load of dissolved minerals, are so much greater than at times of low flow.

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